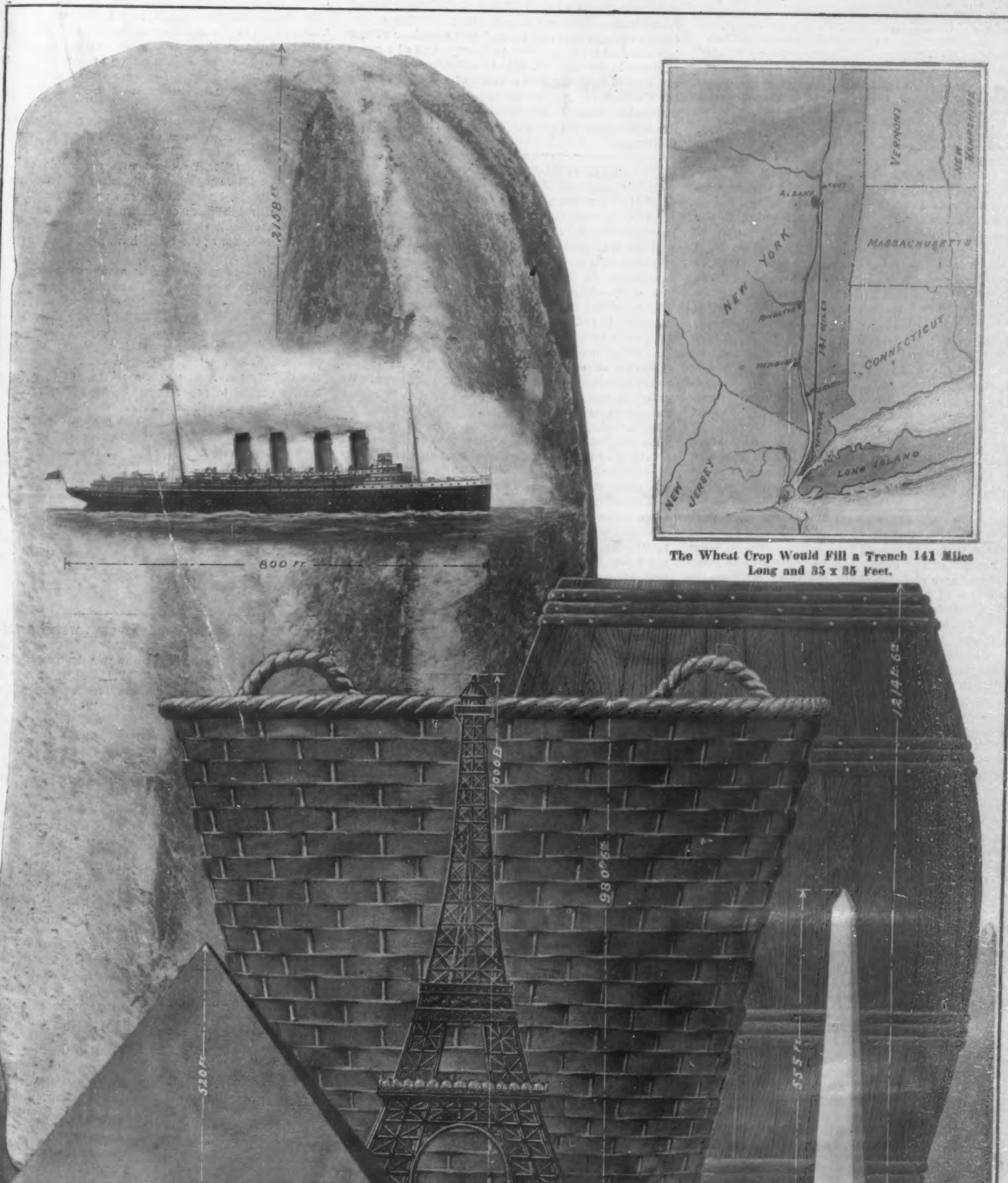
SCIENTIFIC AMERICAN

[Entered at the Post Office of New York, N. Y., as Second Class Matter. Copyright, 1907, by Munn & Co.]

Vol. XCVI.—No. 22. ESTABLISHED 1845. | NEW YORK, JUNE 1, 1907. | 10 CENTS A COPY $3.00 A YEAR.



The Wheat Crop Would Fill a Trench 141 Miles Long and 35 x 35 Feet.

The 735,260,970-Bushel Wheat Crop of 1906, Converted Into a 1,214-Foot Barrel of Flour and Baked Into an Immense Loaf 2,158 Feet High.

WHAT OUR WHEAT CROP MEANS.—[See page 450.]

SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO. - - Editors and Proprietors

Published Weekly at

No. 361 Broadway, New York

TERMS TO SUBSCRIBERS

One copy, one year, for the United States or Mexico.................$3.00
One copy, one year, for Canada.................................... 3.75
One copy, one year, to any foreign country, postage prepaid, £0 18s. 6d. 4.50

THE SCIENTIFIC AMERICAN PUBLICATIONS

Scientific American (Established 1845).........................$3.00 a year
Scientific American Supplement (Established 1876)............... 5.00 "
American Homes and Gardens...................................... 3.00 "
Scientific American Export Edition (Established 1878)........... 3.00 "

The combined subscription rates and rates to foreign countries, including Canada, will be furnished upon application.

Remit by postal or express money order, or by bank draft or check.

MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, JUNE 1, 1907.

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

SLAUGHTER IN WAR AND PEACE.

We have before us the casualty lists of that greatest of all fields of carnage—the railroads of the United States. Lest the gentle reader should object to our phraseology, calling it sensational, we ask his attention to the Interstate Commerce Commission statistics of deaths and injuries for the last three months of 1906, which opens with the following statement: "The number of persons killed in train accidents during the months of October, November, and December, 1906, as shown in reports made by the railroad companies to the Interstate Commerce Commission, under the "accident law" of March 3, 1901, was 474, and of injured 4,940. Accidents of other kinds, including those sustained by employees while at work, and by passengers in getting on or off the cars, etc., bring the total number of casualties up to 20,944 (1,430 killed and 19,514 injured)."

At the above rate, the total number of people killed on the railroads in twelve months would be 5,720, and the total number injured 78,056, or a total of 83,776 casualties in a single year. If we remember rightly, this is more than twice as many as were killed on the British side during all the years of the Boer war; while the total number of injured exceeds the total number that were wounded by bullet and shell. But such wars as the South African trouble come intermittently and with decreasing frequency, whereas the casualties of peace are with us always and increase with the passing of the years.

The deaths and injuries on our railroads, appalling in number though they be, represent after all but a fraction of the total number of casualties occurring every year in the prosecution of the so-called arts of peace. The mine, the quarry, the smelting furnace, the mill, the machine shop, all present an annual death and casualty roll which, according to the most eminent authority on the subject in this country, Dr. Josiah Strong, is placed at the stupendous figure of 525,000. The railway accidents and their appalling results are more in the public eye than other disasters, for the reason that practically every citizen travels on the railroads, and that the government collects and publishes the statistics of deaths and injuries. But the grim facts regarding the frequency of deaths and injuries in pursuits other than those identified with railroading are just as real, just as shocking, and every whit as disgraceful to our national good name as those relating to the railroads.

Now, on the basis of over half a million industrial accidents in the United States in a single year, it may be stated that one person out of every 150 is sacrificed in a greater or less degree, ranging from a slight injury to death itself, in the task of carrying on our great industrial works. And the pity and shame of it all is that a large proportion of this pain and death is easily preventable. Two things are necessary: first, the public must be awakened to the realization of the disgrace which such a condition of things puts upon the nation, and to a realization of the vast amount of personal loss and suffering which these figures represent; and secondly, they must be taught that, by the enactment of proper ordinances governing the safety of life and limb, and the provision of proper devices of a mechanical kind, it would be possible, in a very few years, to reduce the casualty list by probably not less than fifty per cent.

But after all is said and done, it is a question whether the cause of this ghastly sacrifice is not to be found in our national disregard for the sanctity of human life. It is not in the least exaggerating the question to say that there is greater concern shown in the more advanced European countries over the accidental death of a single individual than is displayed in this country over the death of a dozen people by accident. It is certain that until we have learned "how much a man is better than a sheep," and have acquired a decent regard for the sanctity and dignity of life, we are not likely to make much headway in the provision of means for the prevention of accidents. One of the best ways to promote a proper understanding on this subject would be to pass laws making it obligatory upon the part of all great industrial concerns to report every accident, big or little, to a commission which was qualified to gather such statistics. These statistics should be regularly made public, and should form the subject of persistent comment by the press, in the pulpit, upon the lecture platform, and by means of systematized pamphlet distribution.

We can conceive of no other philanthropic movement that would be so worthy of the use of the name and the millions of such of our capitalists as are of humanitarian bent as this. If the prevention of the comparatively small and intermittent slaughter of war is worthy of a peace palace in Europe, and of a peace congress in the United States to which representatives are invited from the four corners of the earth, surely the abolition of the "carnage of peace," whose victims outnumber those of war immeasurably, should command an even larger liberality and an effort more sustained.

SPEED INDICATORS ON LOCOMOTIVES.

Certain recent accidents in this country and abroad point clearly to the necessity for the use of speed indicators on locomotives. Two fatal derailments which have occurred in England were due to the engineers running their trains around curves at speeds greatly in excess of the schedule; and the two most notable derailments of the past few months in this country also occurred on curves, and probably in each case they were due to the same cause. The use of speed recorders is quite general on European railroads, and we believe that on some systems they are in universal use, being considered as indispensable to the safe operation of the trains. Though occasional experiments have been made looking to the adoption of this device in the United States, we believe it is a fact that there is not a railroad on which it has been officially adopted. The present practice is to depend upon the judgment of the engineer, who is supposed, by virtue of his long experience, to be able to tell very closely at what rate of speed his engine is running at any particular time. No doubt, the more intelligent and observing of the engineers do acquire a sense of speed which is remarkably accurate; but it is evident that this will vary greatly with the temperament and intelligence, and that there must be some, and possibly not a few, engineers, who are incapable of making any accurate estimate of speed.

We are largely the creatures of custom and habit. Because we have so long done without speed indicators, we have settled down to the belief that they are unnecessary. And yet, a little sober thought should convince us that this device is, in its way, just as useful and almost as necessary as the steam pressure gage or the vacuum gage. Particularly is it needed on a road which is full of sharp curvature and crowded with crossings, turnouts, and sidings, at many of which a reduction of speed is called for. Even in the case of a train like the Empire State Express, there will probably be not less than half a dozen points on the 140-mile run to Albany, at which the engineer is called upon to slow down from the average running speed of, say, 65 miles an hour to speeds of from 40 miles down to as low as 15 or 20 miles an hour. With an accurate speed register before him the engineer could reduce to the exact speed called for on any particular stretch. The device would be specially useful in cases where the engineer was new to the division, and, therefore, more or less unfamiliar with the run.

Unquestionably, the introduction of speed indicators would be greatly facilitated if there were more of these devices on the market that were absolutely reliable. Too many of the present types are either uncertain in their action, or are so sensitive (that is to say, are subject to such violent oscillations above and below the true reading) that a prejudice has been raised against their use which may require some little time to overcome. Without disparaging the work that has been done already in this direction, it may be affirmed that this is one of the most promising fields to which inventors can direct their attention. The ideal indicator would be one which combined quick response to changes of speed and steadiness of pointer on the index with simplicity and durability of mechanism.

SINGLE-SERVICE PAPER MILK BOTTLES.

Butter is received in tubs and cut into blocks and put into neat paraffine paper boxes; lard is also so handled; oysters are dipped from a tub into neat paper pails; ice cream is sold in paper buckets; eggs are delivered in cellular boxes holding a dozen or half a dozen; chipped beef is delivered in paper boxes, etc. And yet milk, the article of food most susceptible to contamination, is served in bottles which are used again and again. This is vitally wrong. There is too much risk in it. The bottle may be put to too many improper uses. It is not uncommon for the driver of a milk wagon to split a quart of milk into two pints, cap the bottles, and leave them where customers have requested additional pints. This split quart is divided between two unwashed bottles. It is not to be expected that the driver will return to the dairy for clean bottles.

To wash milk bottles clean is difficult, often very difficult. It cannot be done except in boiling hot water. But the men cannot work in boiling water, and so lukewarm or tap water is used, and they do the best they can. Many dairymen have not hesitated to invest large sums of money in the latest and best apparatus obtainable. This is a help, but not the cure. The refilled bottle is an anachronism.

Evidently the glass bottle is a misfit, and wrong. The solution is the abandonment of it, and the substitution of the single-service paper package for milk. These are now just beginning to be available, and many are the incidental advantages they will bring. They do away with innumerable troubles for the milkman.

One of the first paper bottles to be placed on the market is a plain paper cylinder, having a flanged bottom securely fastened therein, and a flanged top held in by frictional contact with the inside of the tube. The lid is provided with tabs folded down inside the flange, by which the cap may be readily removed, although some customers prefer to have the cap more difficult to remove, as a further guarantee that the contents of the bottle have not been tampered with *en route*.

The bottle is made of new spruce-wood paper in clean, sanitary surroundings. After the bottom is put in the bottle is dipped in hot paraffine, the same paraffine the housewife pours over her jellies to keep out the air, moisture, and dust. The bottle is then passed into a sterilizing oven, where it continues to absorb paraffine to saturation, the excess draining back into the dipping tank. The caps are then put in and the bottles packed in paper bags holding a hundred each and the bags sealed, so that the milkman's wagon is laden only with bottles clean and perfectly sanitary.

The bottle weighs less than an ounce, but by reason of its cylindrical construction, with the caps inside, is quite strong. It will support a vertical crushing strain of more than a hundred pounds when filled.

The paraffine coating renders the paper impervious to moisture, so that it may stand for weeks or even months without losing any of its liquid contents.

The new bottle has no effect whatever on milk. The milk never comes into contact with the paper (or the printing thereon) for it is perfectly sealed in, and the paraffine has absolutely no effect on milk in any way.

RUNNING MUNICIPAL TROLLEY CARS WITH GARBAGE AND REFUSE

The city of Nottingham owns two destructors, costing, respectively, $39,000 and $102,000. The latter one is equipped with electric machinery costing $12,000, connected with the tramway lines. The cost of wages and other expenses of the destructors averages about 35 cents a ton of refuse burned. The average quantity of electric units produced is 44.23 per ton. The system of converting refuse into electricity works admirably there, and is a saving to the taxpayers. Only forty other towns in the country use anything similar.

Ashes, kitchen scraps, and house refuse receptacles are placed in metal barrels or large iron receptacles at the rear of the premises, in accordance with the practice in this country, and removed weekly by city employees. The total weight of the refuse is about 1,500 tons a week. It is carted away after being collected and burned in the two destructors, which require no other fuel except a trifle for starting the fire on Mondays. Enough steam is produced by the destructors to provide electricity for a third of the needs of the tramway system. Only tin cans and the like are separated from the refuse and sold. All the rest is used as fuel for the production of electricity.

Besides electricity the Nottingham corporation produces from the house refuse more street-paving stones than it can use. A plant connected with the main destructor mixes the clinkers with cement and places the composition under hydraulic pressure. The artificial bricks thus produced are harder than stone and can be used for building purposes as well as street paving. The engineer in charge of the work claims that from tests made the paving stones thus manufactured will wear longer than any similar composition now being produced, while costing but half the price. Another destructor, larger than either of the two now operating, is contemplated by the city authorities of Nottingham.

According to Power, at Columbus, Ohio, where the water is excessively hard, a water-softening plant with a capacity of 30,000,000 gallons per day is being constructed.

THE HEAVENS IN JUNE.

BY HENRY NORRIS RUSSELL, PH.D.

The planet Mars, which returns to opposition early next month, and comes nearer to the earth than it has been at any time for a dozen years past, has especial claims on the attention of the astronomical world at present. To be sure, it is not yet an agreeable matter for the amateur to observe him, since in the middle of June he rises at about half past 9 in the evening, and does not come to the meridian (where he can best be seen) until 2 o'clock in the morning.

But those professional astronomers whose interests are in planetary affairs, are already rising very early, and spending the small hours of the night in the study of the surface of the body which, next to the moon, we have the best opportunity to see.

What discoveries they may make we cannot of course predict; but many things will be visible to any observer, even if his telescope is small. The ruddy disk of the planet, brighter at the edge than the center, and marked with darker greenish spots, can be seen with a very small instrument if only the air is steady, and even easier to see than the dark areas is the white polar cap.

This is the most prominent feature of the planet's surface, when it first comes well into view; but as time goes on, and the Martian season advances from spring to summer, it steadily shrinks, and at last disappears completely, only to appear once more, as large as ever, when the planet's pole can again be seen, emerging from its long arctic night.

This behavior suggests at once that these "polar caps" are polar snows, which melt away every summer, and fall again when winter has set in. But grave objections have been made to this theory.

Mars, like the earth, presumably gets its heat as well as its light from the sun. Now it is half as far again from the sun as the earth is, and since the amount of heat received from the sun varies inversely as the square of a planet's distance, it receives only 44 per cent as much heat per square mile as the earth does. But its polar caps melt off completely every summer, while the earth's polar snows do not. It would therefore seem as if Mars must be hotter than the earth, and we seem involved in a contradiction.

A recent paper by Mr. Percival Lowell, who at his observatory in Arizona has done so much to advance our knowledge of the planet, clears up this difficulty in a very pretty fashion.

It is true that the earth receives much more heat than Mars does; but it is not the heat received, but that *retained* by a planet which goes to warm it.

Now Mars reflects some 27 per cent of the light falling on it, and consequently retains the remaining 73 per cent. How much the earth reflects we can only estimate. But we know that half its surface on the average is covered with clouds, and that these reflect some 72 per cent of the light falling on them. Here is a loss of 36 per cent of the incident energy at the start. Then, even under a clear sky, a great deal of light is reflected by our atmosphere, which would look as bright if we looked down into it from above as it does when we look up through it from below. Finally, we have the light reflected from the materials of the earth's surface itself. Studying all this in detail, Mr. Lowell comes to the conclusion that the earth under a clear sky reflects about 59 per cent of the total energy falling on it, and retains but 41 per cent. Taking also into account the loss of heat caused by the shading effect of the clouds, he estimates that the amount of heat received by the surface of Mars per square mile is actually a little greater than on the earth. But Mars has less atmosphere than the earth, and in consequence its surface will lose more heat by radiation into space, just as high mountains do on the earth. Allowing also for this, Mr. Lowell finally concludes that the amount of heat retained by the surface of Mars, and going to warm it up, is about 10 per cent less than the corresponding quantity for the earth. The absolute temperature of Mars, that is, the temperature measured from the absolute zero of the physicists, —460 deg. F., would be 2½ per cent less than that of the earth. Assuming the mean temperature of the earth to be 60 deg. F., we find 46 deg. for that of Mars. Some of Mr. Lowell's estimates are admittedly uncertain, but he has certainly proved that it is quite possible, and indeed probable, that the surface of Mars may be heated to a temperature well above the freezing point of water by the sun's rays alone.

It is therefore reasonable to believe that the polar caps of Mars are really snow fields. As for their melting off in summer, we have good reason to believe they are very thin compared with those on the earth. Six inches of snow covers the ground just as well as six miles, and looks the same from a distance, and the rapid melting of the caps is the only way we have to estimate their thickness.

THE HEAVENS.

Our map shows at a glance what meets our eyes in the early evening. The Great Bear and the Dragon are high in the northern sky, above the Pole, and the Little Bear, Cepheus, and Cassiopeia are below them, the last far down on the horizon. Auriga the Charioteer and the Twins are setting in the northwest, their bright stars Capella, Castor, and Pollux being very low. The Crab and the Sea Serpent lie on the dull southwestern horizon. The Lion, with the bright star Regulus, is higher up in the west, and the Virgin, with the rather brighter star Spica, in the south. Above her, almost overhead, is Boötes the Herdsman, with the splendid yellow Arcturus, brighter than any other star now in sight.

The Northern Crown and Hercules lie to the eastward, and lower down is the bright star Vega, in the constellation of the Lyre. Below this Cygnus the Swan has just come into view. The Eagle, with another first-magnitude star, Altair, is due east, and the tangled forms of the Serpent and the Serpent Bearer fill the southeastern sky. The Scorpion, whose heart is marked by the fiery red Antares, is well seen just east of south, and due south is part of the Centaur—a fine southern constellation whose brightest star we never see. Those who live within the tropics may see them at this season, and near them, to the westward, the Southern Cross.

THE PLANETS.

Mercury is evening star all through June, and can easily be seen at the end of the month, on or about the 27th, when he is at elongation 25½ degrees from the sun. At this time he is on the borders of Gemini and Cancer, not far from Castor and Pollux, and brighter than either. He sets at about 9 P. M., and will readily be observed.

Venus is morning star in Aries and Taurus, rising about 3 A. M. in the middle of the month. Mars is in Sagittarius, rising at about 10 P. M. on the 1st, and 8:15 P. M. on the 30th. He is very near the earth, and still coming nearer, being some 46 million miles away when June begins, and 39 million when it ends. He is almost as bright as Jupiter, and cannot be mistaken for anything else.

Jupiter is evening star in Gemini. Early in the month he is still conspicuous, setting at about 9:30 P. M., but toward its end he is too deep in the twilight to be observable. On the afternoon of the 15th he is in conjunction with Mercury, at a distance rather more than 1½ degrees.

Saturn is in Aquarius, rising about midnight in the middle of the month. He is in quadrature with the sun on the 18th. We still see the dark side of his rings, so that, except in the most powerful telescopes, he appears devoid of these appendages.

Uranus is in Sagittarius, not far from Mars, and like him very far south. He is right above the Milk Dipper, at a distance of about three degrees, and among a group of small stars, from which his motion serves to distinguish him.

Neptune is in Gemini, too near the sun to be observed.

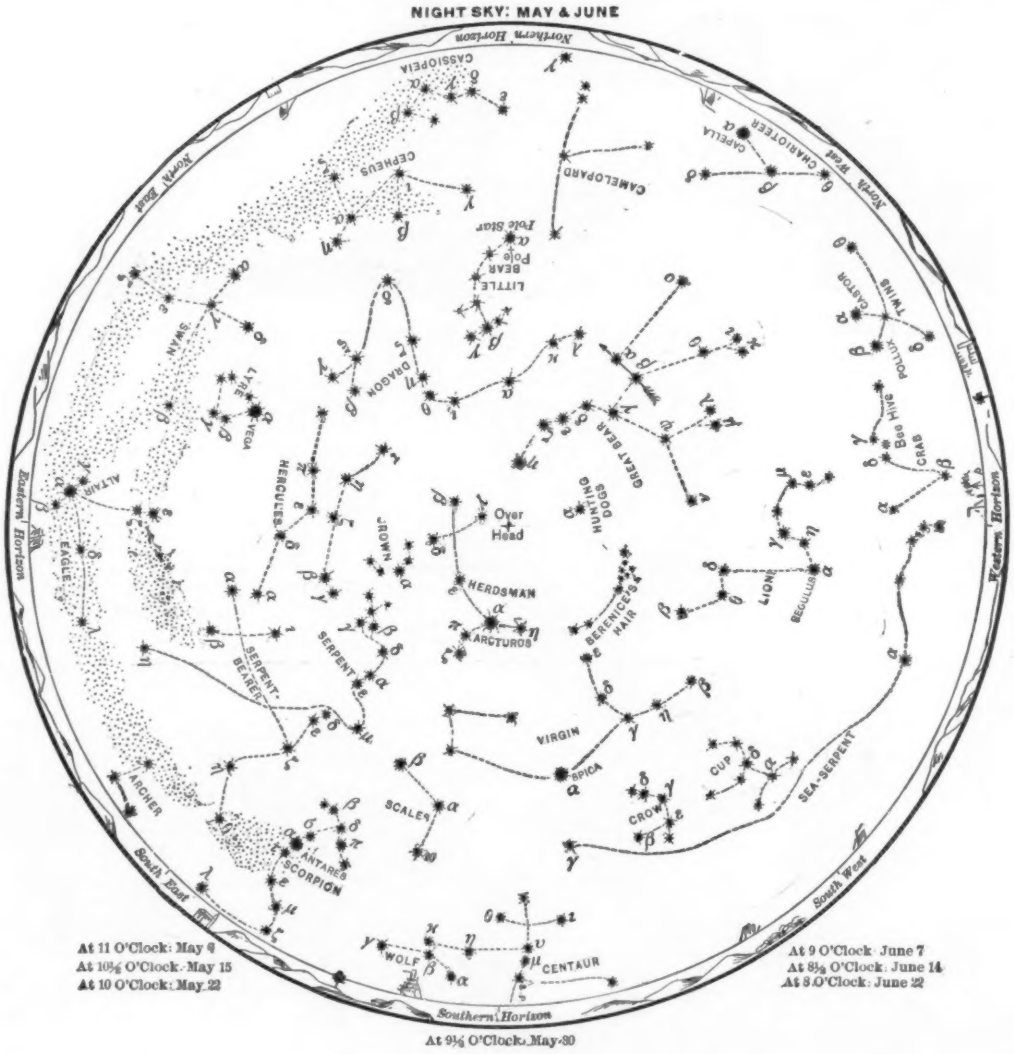
THE MOON.

Last quarter occurs at midnight on June 2, new moon at 7 P. M. on the 10th, first quarter at 10 P. M. on the 18th, and full moon at 4 P. M. on the 25th. The moon is nearest us on the 25th, and farthest off on the 12th. She is in conjunction with Saturn on the 4th, Venus on the 8th, Mercury and Neptune on the 12th, Jupiter on the 13th, and Uranus and Mars on the 26th.

At 9 A. M. on the 22d the sun reaches its greatest declination north of the equator and enters the sign of Cancer, and in the parlance of the almanac, "summer commences."

Princeton University Observatory.

NIGHT SKY: MAY & JUNE



In the map, stars of the first magnitude are eight-pointed; second magnitude, six-pointed; third magnitude, five-pointed; fourth magnitude (a few), four pointed; fifth magnitude (very few), three-pointed, counting the points only as shown in the solid outline, without the intermediate lines signifying star rays.

New Invention for Treating Flax.

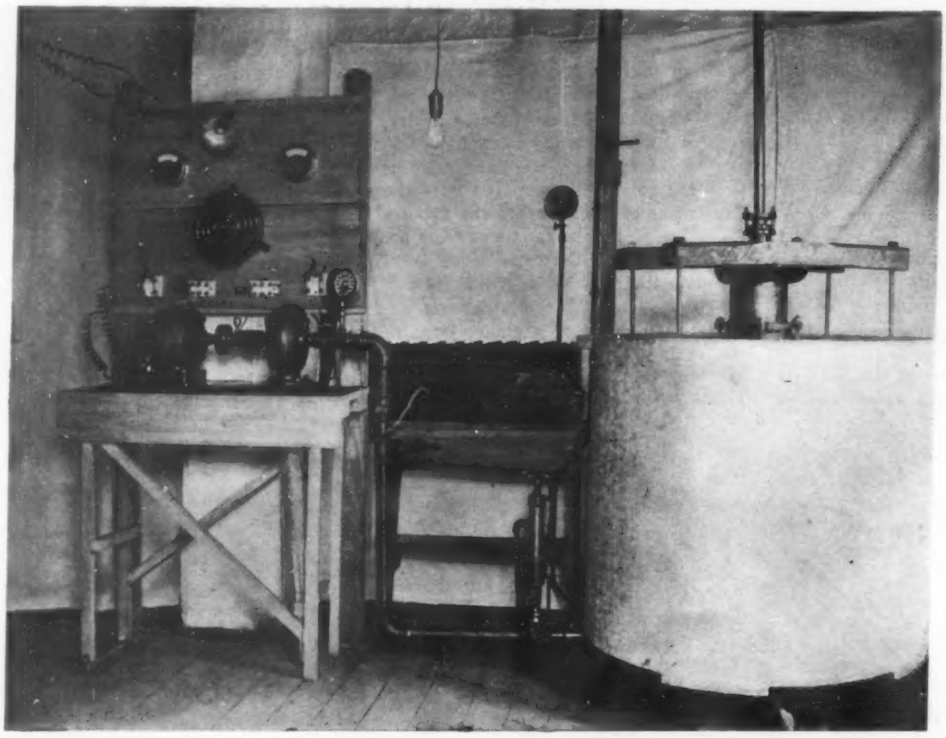
A new Australian process for converting worthless flax into a good fiber is described in the London Commercial Intelligence, as follows:

Sheaves of straw are immersed in a hot neutral solution for about one hour, after which the flax is passed through rollers during which it is sprayed, by steam force, with a special solution, and then with clean water. The flax is then dried and the straws broken and scutched in the usual manner. Each bath holds about 336 pounds of fiber and the cost of the solution (there) does not exceed 48 cents. The same bath may be used repeatedly, thus reducing the cost of the operation. Frequent use of the same bath somewhat darkens the fiber, but for some purposes this is little or no detriment. The light fiber can be used for many purposes without further bleaching treatment, which is frequently an expensive process. It is claimed by the inventors that their process can be carried on continuously, independent of weather conditions, and also that the fiber is produced so cheaply that it will ultimately, to a great extent, take the place of other fibers after meeting the world's demand for Linum flax.

The method upon which all cooling towers work is to divide the water up so that it presents a maximum amount of surface to the air. All cooling towers work on the counter-current principle. The water is lifted 25 feet to 30 feet up the tower, and then allowed to fall over specially designed splash bars, while the air enters the tower at the bottom and ascends through the falling drops of water.

DOMESTIC ELECTRIC LIGHT PLANT DRIVEN BY A WINDMILL.

A windmill, in this country, at least, is seldom put to any work other than pumping water, for the reason that its power is so variable. From time to time the question has been raised of storing this erratic energy, so that it may be delivered at a uniform rate for various purposes. But the problem of storing the power has proved more difficult than might at first be imagined, and few really practical apparatus of this sort have been devised. However, Mr. R. W. Wilson of Noblesville, Ind., seems to have reached a successful solution of the question, at least as far as the requirements of his own home are concerned; for with the power furnished by his windmill, he operates a small electric light plant which illuminates his house and barn. The windmill is of the usual type adapted for pumping water. It stands on a tower 50 feet high, and operates a force pump of 12-inch stroke with cylinder 3½ inches in diameter. The water is pumped to a regulator, situated in the basement of the building. This regulator consists of a cylinder in which a heavily-weighted plunger is fitted. When the cylinder is filled with water, the rising plunger strikes a catch which opens a valve in a pipe communicating with a water motor. The water motor is direct-connected to a dynamo which, in turn, generates the electric power necessary to energize the lighting system. A storage battery is provided to store any excess of current, or to store the entire output of current when the lights are not in use. An automatic switch connects the dynamo with the storage battery, so that when the dynamo stops or runs very slowly, the current from the battery will not operate back through the generator. Owing to the weight of the plunger in the regulator, the water motor is under an almost constant pressure. When the plunger reaches the bottom of the cylinder, it strikes a trip, which closes the valve in the pipe running to the water motor. The action of the motor is thus rendered intermittent. The storage battery comprises eleven cells, which store sufficient current to supply Mr. Wilson's home with light for six or seven days, so that in case the wind should die out for several days, he would still have sufficient current for all his needs. One of our illustrations shows a section of the building and the pumping system. This arrangement differs somewhat from the system which Mr. Wilson has actually installed in his building, in that the electric apparatus is situated in a kitchen in place of the basement. The advantage of this is that sufficient head is provided to conduct the water from the motor to a trough in the yard, where it may be used for watering stock.

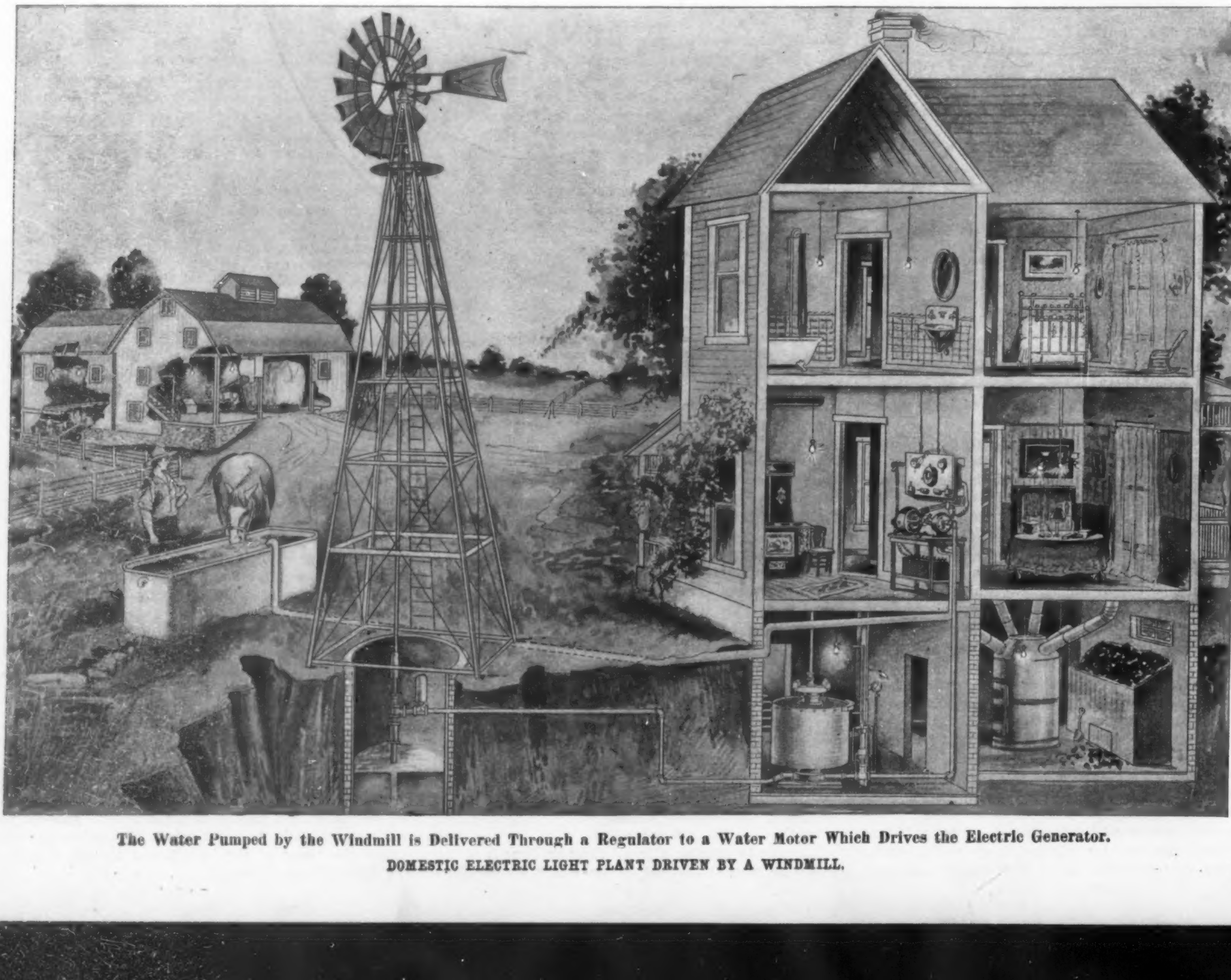


Complete Lighting Set Consisting of Regulator, Water Motor, Dynamo, and Storage Battery.

Arrangements are being discussed for an electrical exposition at Niagara Falls in 1908.

A New Textile Fiber.

A vegetable fiber obtained from the dwarf palm tree now forms one of the staple products of the Algerian region, and the industry has lately taken a great extension. The dwarf palm was heretofore considered as having no value for commercial use, and even as a harmful plant, but owing to the method of extracting the fiber from the plant which is now so successful, the use of the product is on the increase and it can be employed to advantage to replace the animal fiber or hair which is so extensively used for mattresses, woven products, harness and carriage work, and these industries are now commencing to use it and are placing large orders for the fiber. Besides this, the railway companies both in France and elsewhere on the Continent are beginning to employ the fiber for military bedding purposes. While horse hair appears to be easily attacked by moths, the fibers of the dwarf palm resist the attacks of insects; and besides the above uses for it, we may also mention the manufacture of various tissues and even of hats. Algeria seems to have the monopoly of the fiber industry for the present. The natives collect the raw material, consisting of the leaves of the dwarf palm, and bring them to the factories. Here there is installed a carding apparatus, the old method being to work it by hand, but recently a form of steam carding machine has been used, and it gives much better results. By this process the leaf is transformed into vegetable fiber, which is afterward spun and braided, this being done generally by hand. In the primitive state the vegetable fiber is valued at $9 to $12 per ton. When it is dyed in black, the price is very nearly doubled. In Algeria there are already a number of these factories, which are scattered in different localities. The department of Algiers has the best plants and is thus able to manufacture a superior quality of fiber. Cords which are made from it are remarkable for their length, flexibility, and elasticity.



The Water Pumped by the Windmill is Delivered Through a Regulator to a Water Motor Which Drives the Electric Generator.

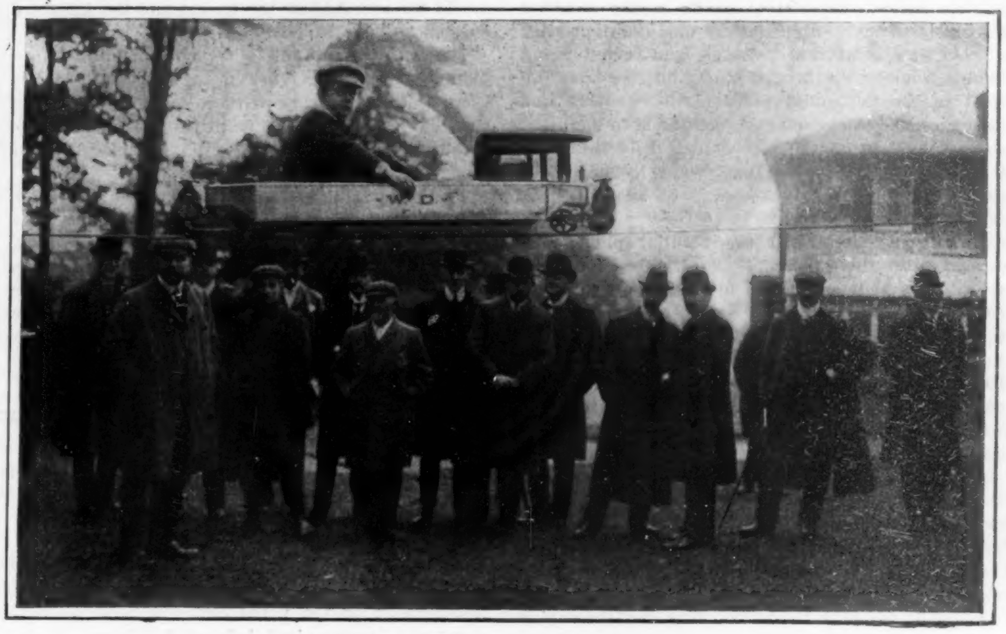
DOMESTIC ELECTRIC LIGHT PLANT DRIVEN BY A WINDMILL.

THE BRENNAN GYROSCOPE MONORAIL.

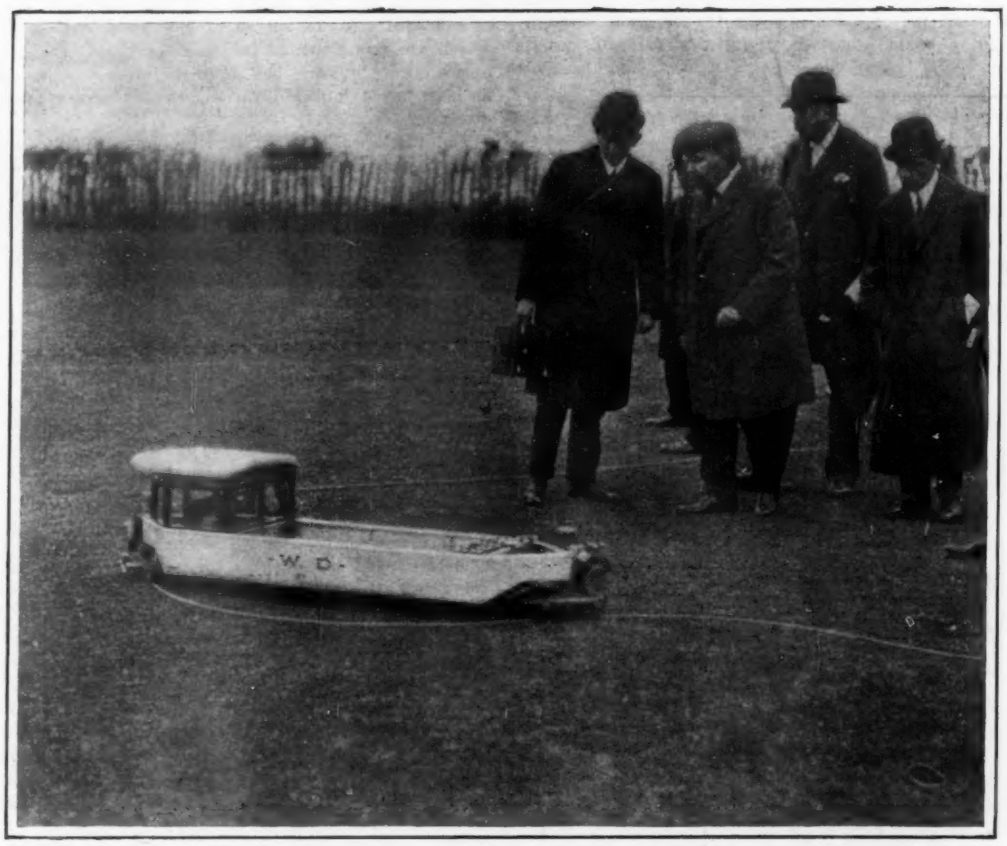
Were it not for the fact that its inventor bears a distinguished name, and that the exploitation of the device occupied two hours of the time of the last meeting of the Royal Society in London, the Brennan gyroscopic locomotive would deserve no further notice than is usually given to any interesting scientific toy. At the present writing, indeed, it cannot be regarded as having demonstrated its practical value, at least as applied to heavy trains of the kind that are now running on the railroad systems of the world. The model locomotive exhibited before the Society was only six feet long, and, judging from the illustrations, it must have been of rather light construction. It is not safe to argue that because in this small size the invention is operative, therefore it would be operative if built to the greater dimensions and enormously greater weight of a full-sized railroad train. We should be prepared to find that the weight and power of the gyroscopes would quickly increase to a point where they would be prohibitive. That is to say, the apparatus would be so bulky and heavy, and would make such considerable demands upon the available power, as to render the construction and operation of a train of standard size commercially impracticable.

From a study of the illustrations it will be seen that the locomotive consists of a long, shallow body, carried on a pair of two-wheeled motor trucks, one at each end of the car. It is driven by two electric motors, mounted one above the outer wheel of each truck, the power being transmitted by gears inclosed in gear cases, one on each side of the driving wheels. All four wheels act as drivers, power being transmitted to the inner wheels by means of outside coupling rods, similar to those used on the steam locomotive. The gear case and motors are clearly shown in the photographs. At each end of the car and mounted centrally above the swiveling trucks is a pneumatic brake cylinder, and above each cylinder is mounted a hand-wheel, which engages a threaded extension of the piston rod, and is adapted to be used in case of a failure of the pneumatic brake. In the model shown, there is a small closed compartment at the forward end of the car; and in the after portion of this, mounted on the floor of the car, is the double gyroscope, which serves to maintain the car in equilibrium. The gyroscopes are mounted in an air-tight case in which a partial vacuum is constantly maintained. They rotate in opposite directions in a vertical plane at the high speed of 7,500 revolutions per minute. Provision is made for assisting the gyroscopes in returning quickly to the horizontal plane. They are driven by small electric motors. The object of running the gyroscopes *in vacuo* is, of course, to get rid of the skin friction of the air, and Mr. Brennan, the inventor, claims that he has been so far successful that the model car will remain standing upright on its single rail for a considerable time after the current has been cut off. The motive power of the model is derived from accumulators carried by the vehicle itself, and current is also drawn from these to keep the gyroscope wheels in motion. In the model it is stated that the weight allotted to the steadying apparatus amounts to only about five per cent of the total weight.

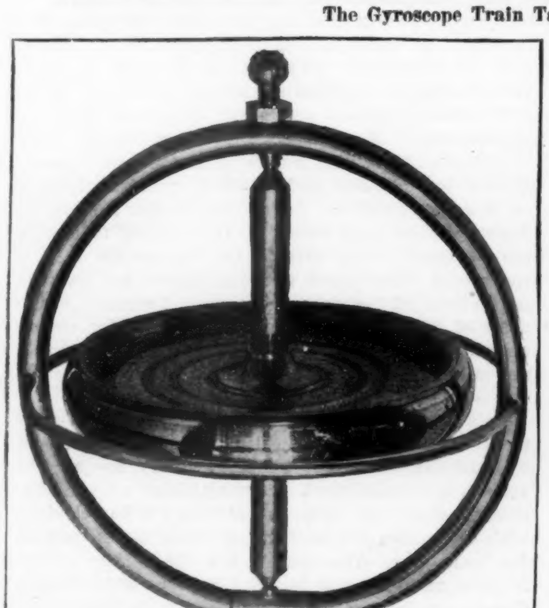
Mr. Brennan is an Australian, who achieved worldwide fame by his invention of the torpedo called by his name. The British government thought so highly of his invention, that it is credited with having paid him $550,000 for the exclusive rights to manufacture it. In the tests which were made, either before the Royal Society, where it was sent around the meeting room at Burlington House, or on the larger experimental track at the private grounds of Mr. Brennan, the model was sent around unusually sharp curves, up and down steep and abruptly changing grades, and caused to run on a wire cable across a span of fifty



The Car Balanced on a Wire Rope.



The Gyroscope Train Taking a Sharp Curve.



The Simplest Form of Gyroscope.

Mr. Brennan Demonstrating His Invention at Brighton, England.

THE BRENNAN GYROSCOPE MONORAIL.

feet. One curious experiment, made in the society's room, consisted in running the car on to a tight wire rope fixed to a stout timber frame, and then turning the whole frame down through ninety degrees from the vertical to the horizontal position. While this was being done, the vehicle, unaided, continued to maintain a vertical position on the rope, and it held this position until the gyroscope frames were locked, when supports were of course necessary to keep the car upright.

With this novel railroad the peculiar phenomena associated with the gyroscope are strikingly demonstrated. In rounding a curve at high speed, instead of the car having a tendency to fly outward off the track as does the ordinary railroad train, the inner edge dips, so that the vehicle leans inward as does a cyclist when rounding a sharp curve on the racing track. Similarly, when a heavy weight is thrown on one edge of the car, instead of that side dipping, it rises, combating the pressure there imposed; this latter tendency is even more graphically illustrated by pressing the hand upon one side of the car, when one can feel the car forcing itself upward, opposing the efforts to disturb its equilibrium.

The inventor is now engaged in constructing a full-sized vehicle upon this principle. In this instance the car will be driven by a 100-horse-power gasoline engine coupled direct to the motor. The gyroscope will be 33 inches in diameter and make from 2,000 to 3,000 revolutions per minute. The road wheels will be motor-driven, and in this instance change-speed gears will be provided to facilitate hill climbing. In the case of the smaller model, in order to insure easy climbing of the more precipitous ascents, the speed is only seven miles per hour; but this factor can be modified to meet any conditions.

The evolution of this invention is the result of some thirty years' continual experiments, though the present model railway and its equipment has been completed for more than two years. Publicity of the invention has been delayed in deference to the requests of the British and Indian governments, both of which have financed the experiments to a certain extent. It is possible that it will be given a trial on light railroads in India, where railroad construction, owing to the mountainous nature of the country, especially in the northern territories, is beset with numerous engineering difficulties rendering construction highly expensive.

OUR 735,000,000-BUSHEL WHEAT CROP.

The commonest article in daily use is "bread," and its supreme importance is indicated by the fact that in all ages it has been considered as the symbol of food, and truly it is the "staff of life." The cultivation and milling of cereals is of the highest antiquity, and the references to the baking of bread occur on some of the oldest monuments.

Wheat is a splendid cereal crop, and the United States leads the world in its production. The 1906 crops, according to the official figures, are as follows:

	Bushels.
United States	735,261,970
Russia	450,000,000
France	324,725,000
India	319,586,000
Austria-Hungary	268,574,000
Italy	168,000,000
Spain	154,090,000
Germany	144,754,000
Argentina	134,931,000
Canada	131,614,000
Roumania	113,867,000

The crops of other countries bring the total up to the enormous figure of 3,423,704,000 bushels, so that the production of the United States is nearly 20 per cent of the world's output.

A graphical comparison of this crop with the finished product typified by bread and the intermediate stage—flour—is very interesting, and we have made an attempt to show the magnitude of the crop by means of well-known objects such as the Great Pyramid and the Washington Monument.

If the 735,261,970 bushels of wheat were placed in a bushel basket of standard shape, the basket would measure 792 feet in diameter at the bottom and 1,225 feet at the top, and would be 980 feet high. It would have to be strong enough to sustain the weight of 1,579,433 tons. The Eiffel Tower is a good object for comparison. Visitors in the crown of the tower would be able to just look over the sea of wheat. After the miller has taken the basket of wheat and milled the grain, he finds he has some 16,116,664 barrels of flour, which if put in one huge barrel would be 1,214½ feet high, and the largest diameter would be 962½ feet.

The baker now steps in, and out of this flour bakes 4,834,999,200 loaves of bread of standard size; and if this bread were all put into one loaf, it would measure 1,002 feet on the bottom, 1,387 feet at the top; it would also be 616½ feet thick and some 2,158 feet long. If this loaf of bread were set on end, the finished product would far overshadow the basket and the intermediate stage—the flour barrel.

The wheat would fill a trench 141 miles long—the distance from New York to Albany—and 35 feet in cross section. In view of these facts, is it any wonder that our transportation facilities are strained to the breaking point in carrying this enormously valuable crop?

The wheat crop of the entire world is far below the average this year, and it is a much-mooted question whether we shall have any wheat to spare to make up the deficit abroad; and for this reason the price of wheat on our produce exchanges has gone upward of one dollar a bushel. It seems probable that the United States will be the arbiter of prices in the world's wheat market for some months to come.

TO THE JAMESTOWN EXPOSITION BY MOTOR BOAT.

BY GEORGE ETHELBERT WALSH.

No class of visitors to the Jamestown Exposition will find greater attractions this summer than those fortunate enough to own motor boats. Besides enjoying the pleasure of cruising through one of the most picturesque bays on our Atlantic coast, the owners of motor boats will find themselves in a measure independent of the usual crowded hotel accommodations and inconvenient lodging facilities. With Norfolk, Virginia Beach, and Old Point Comfort within easy reach by water from Jamestown, the motor boat enthusiast can visit the exhibition in the daytime and spend the nights miles away from the tumult and crowd, comfortably housed in his own little boat.

The problem to many is, How to get to Jamestown in a small motor boat? Of the thousands of owners of motor boats scattered along the Atlantic coast,

COURSE OF MOTOR BOAT TO JAMESTOWN.

probably only a few realize the comparatively safe and easy route which the canals and rivers offer across the States of New Jersey, Delaware, and Maryland. The outside route is too dangerous for the average small motor boat, and many who would otherwise enjoy the trip are afraid to make such a venturous journey in a boat twenty to thirty feet in length. But the inside route is shorter, safer, and in many ways the more picturesque. Instead of running miles out at sea, dodging dangerous capes and treacherous shoals, the motor boat on the inside route from New York or any point on the Sound or Long Island makes its way quietly and safely through a system of canals, rivers, and bays. Any boat from sixteen feet in length up to the thirty-footers, drawing no more than four or five feet of water, can take the inside route with the most happy results.

With New York as the starting point, the motor boat makes its way down the Upper Bay and enters the Kill von Kull back of Staten Island and then through the Arthur Kill to the entrance of the Raritan River at South Amboy. This run is scarcely more than eighteen miles, and through smooth and safe water. The Raritan River runs in a most irregular line from this port to New Brunswick, a total distance of less than eleven miles. A motor boat drawing only four or five feet of water can make the passage without mishap. If the trip is taken just before high tide, the lines of the banks will be clearly defined by the marsh grass, and the channel can be followed easily.

At New Brunswick the Delaware and Raritan Canal, which has a depth of seven feet, enters the Raritan River, and vessels with masts fifty feet high can pass through the canal. The distance through the canal from New Brunswick to the Delaware River below Bordentown is 44 miles, and at the regulation speed of four and a half miles per hour the trip will take the better part of a day. The toll through the canal is collected at the entrance, and clearance papers are given. The canal connects with the Delaware River below Bordentown, and one passes through or near such historical places as Bound Brook, Millstone, Kingston, Trenton, and Bordentown. Once on the Delaware River, the next objective point is Delaware City, sixty miles down the river. The navigation of the Delaware River is a rare treat. The river broadens and stretches out in pleasant vistas. At no point is the channel less than six feet in depth. This is found near the beginning at Kinkora Bar, and when that is safely passed there is an average depth of over seven feet. At low tide many of the bars and flats are exposed to full view, and the direction of the channel can easily be noted by the eye. At Delaware City commences the Chesapeake and Delaware Canal, which is fourteen miles long and has an average depth of nine feet. There are three locks in it, and all bridges have draws over the canal. The ordinary small motor boat can pass under these bridges without trouble. As in the former canal the speed allowed is four and a half miles, and any violation of this rule may result in a fine of $20. In approaching locks or drawbridges which are to be opened in either of these canals, the notice either by horn, bell, or whistle must be sounded at least three hundred yards away to secure prompt attention.

The Chesapeake Canal carries one to Back Creek, near Chesapeake City, a short, crooked, and somewhat treacherous body of water, less than four miles in length. The shoals can be avoided, however, by keeping well away from either shore. Unfortunately, the channel is not marked by buoys or other danger signs. At some points Back Creek is only six and seven feet deep, but at others it is nine and ten feet deep and from 120 to 150 feet wide. The creek connects with Elk River, which runs to Turkey Point on the Chesapeake, a distance of eight miles. Elk River is wide and deep enough to follow without trouble. Turkey Point is directly on Chesapeake Bay, and the wide expanse of water stretches 195 miles down to Norfolk. It broadens out as the journey extends. The views are all that one can desire, and boats of all descriptions increase in numbers. There are abundant good harbors and many famous towns and cities to see. One can spend weeks in exploring either coast and always find something new to enjoy. The western shore is generally followed by small boats to Norfolk, which takes one past the harbor of Baltimore, Annapolis, and other important places. Norfolk is reached by following the western shore, and Jamestown is just in the offing. The total distance from New York city to Norfolk by this route is approximately 352 miles, and it can be made in from four to five days, traveling at a speed of seven miles an hour; but as allowances must be made for passing through canals and locks, a week should be taken for the trip.

The requirements for such a trip are simple. A motor boat sixteen feet long and four feet beam can do it just as easily as one twenty-five feet in length and six feet beam. There is no necessity for provisioning for a long journey at any point, for towns and cities are passed constantly, where supplies can be purchased. If one chooses, the nights can be spent in hotels and boarding houses in the different towns. With a few cushions and blankets provided, sleeping on the boat will not be an unpleasant experience. Waterproof blankets should be taken along to protect the occupants from rain. On Chesapeake Bay a spray hood would prove very serviceable, and an awning to keep off the glare of the sun. The usual equipment of life preservers should be carried for emergencies. The fuel supply can be replenished at almost any point along the route.

It is said that a high polish may be obtained after nickel plating on small steel articles, such as screws, by tumbling them with leather and dry rouge. The articles are placed in a tumbling-barrel with leather scraps. Some dry rouge is put into the barrel along with the screws and leather and the whole is tumbled for some time. The rouge coats the surface of the leather, and causes it to act like a polishing wheel. Canvas scraps may be used in place of leather.

According to the Ironmonger, Mr. E. L. Rinmann, of the University of Upsala, claims to have discovered a new process for the electrical extraction of aluminium from blue clay, by which the cost of production is reduced to about one-quarter of the present rate.

Correspondence.

Salvage by Amputation.

To the Editor of the SCIENTIFIC AMERICAN:

I was very much interested in your article in April 27 number of SCIENTIFIC AMERICAN on the manner in which the White Star liner "Suevic" was saved. But the writer is in error in saying this is the first time that a steamer has ever been saved by this process of amputation. The identical operation was performed on the large British freighter "Milwaukee" five or six years ago, when she went on the rocks off the coast of Scotland. Her after part was then floated to dock and the front part rebuilt on, by one of the large Scotch shipbuilding firms.

ARTHUR E. TIMMIS,
Mechanical Draftsman.

Northern Pacific Railroad Company, Tacoma, Wash., May 1, 1907.

Some Ideas on Mechanical Flight.

To the Editor of the SCIENTIFIC AMERICAN:

The mechanics of bird flight have often been in dispute, considerable misapprehension still exists on the subject, and as the successful aeroplane will have to conform very closely to the laws governing bird flight, the subject is of some importance. It may be questioned whether rapid and sustained flight is sufficiently accounted for on the hypothesis of peculiarities in wing curvature, strength of the pectoral muscles, and the sustaining power of the wind. Whoever has observed the flight of a homing pigeon or the leisurely flappings of the crow, carrying it over the fields with the speed of an express train—and who knows something of the power expended in driving a wing model a few yards—must have been conscious of a deficiency somewhere in the accepted theory. A bird in rapid horizontal progress acquires momentum, the mode of flying undergoes a change, the wings are not then used solely for elevation and propulsion, but act in a third capacity, as supporters and accelerators of momentum, it might almost be said that momentum flies the bird. While this is not strictly true, certain it is that it plays an important part in determining the ability of the bird to perform those evolutions and gyrations that have so astonished observers. Prof. Graham Bell in his treatise on kites, mentions having observed a kite advance into a strong breeze by virtue of its weight and velocity, and enunciates the law that momentum is the sum of weight and velocity. By it, flight may be accomplished without the use of the retaining cord. Success in aerial navigation will be obtained by a small, compact, high-powered machine of considerable weight, which will fly at a high speed, and having acquired momentum, consume very little power, if designed so as to utilize the force of gravity, as do some of the smaller flying creatures—principally the sparrow—which in a flight of some duration makes a series of swift descents and ascents, regaining, by a few strokes of the wings, when near the top of the rise, the height lost in friction—a considerable saving in the power ordinarily required, could be effected. For a time dirigible balloons and slow-flying machines of large wing area will impede progress, but eventually these will be discarded in favor of the swifter machine, not only for reasons of economy, but because of the very much more important fact that its small wing area, great weight, and high speed will enable it to penetrate and successfully combat the prevailing wind currents; in short, make it independent of the wind, which after all is the chief desideratum. It may be said in passing that the labors of Count Zeppelin and his contemporaries are so much time and money wasted. However much we may admire the courage and pertinacity of the Count, his judgment in spending a large fortune on such an unreliable and manifestly imperfect thing as a balloon—regardless of the form it may be made to assume—is scarcely to be commended. The balloon offers a quick and comparatively safe method for getting into the air, but its usefulness begins and ends there, for reasons that are too well known to need repetition. A good illustration of the comparative value of the balloon and flying machine, and which these latest attempts at locomotion in a measure parallel, is the old-time sailing vessel, wholly dependent on the wind, and owing its safe arrival to a favoring breeze, and a modern, up-to-date liner, forging its way into the teeth of the fiercest gale by virtue of its weight and inherent power. My own design for an aeroplane—the construction of which must remain in abeyance, through lack of funds—shows a machine of 350 pounds including the weight of its operator (137 pounds) with a supporting surface of one square foot per pound, divided into two sets of superimposed planes, placed one behind the other and curved in the direction of their length. The framework to be constructed from elliptical steel tubing supported on a long, slender, boat-shaped hull. I am experimenting with a means for obtaining automatic stability, which I am confident will not only conquer this greatest of difficulties, but also that of arising vertically and alighting with safety. Granting that the means were forthcoming to properly perfect it, a machine of this description—with the hull fashioned from prepared paper, say, to secure strength and lightness, and the superstructure of elliptic-shaped tubing to reduce the friction, equipped with my device for insuring perfect automatic stability and driven by four two-bladed propellers, actuated by a 25-horse-power engine of the lightest possible construction—would mark an advance in the line of march toward perfection so great as to leave very little to be accomplished. In regard to its sphere of usefulness, a misconception exists that requires correction. Even present-day writers on the subject have fallen into the error of ascribing as the principal retarding cause in the way of its more speedy perfection the fact that it cannot be used in competition with existing modes of transportation; but we have seen the automobile achieve a great success, chiefly as a pleasure vehicle, and there is no doubt that in its final analysis the flying machine will come to be regarded as the pleasure craft *par excellence.*

JOHN C. PRESS.

South Norwalk, Conn.

Aeronautical Enthusiasm.

To the Editor of the SCIENTIFIC AMERICAN:

The over-enthusiasm shown by a large majority of would-be flying-machine inventors, and their desire to at once appear before the footlights of the world's stage, upon the first conception or dream of a plan to navigate the air is wonderfully apparent.

Many of them, too, get no further along in the mystery of this great problem than the making of a few drawings, when, lo! it is announced to the world that Mr J. W. has, after years of study, practically solved the problem. Two or three of J. W.'s aerial flyers and a few hundred pounds of dynamite are the only essentials needed to strike terror to all warring nations.

How beautifully this dream of the airship inventor has been portrayed in the past few years, and how truly idiotic it proved to be after its exploitation!

The writer has in mind a few of these inventors, who, previous to the breaking out of the Spanish-American war, were telling the public how, upon short notice, with their dirigible balloons and flying machines, they could bring a war to a sudden close, once it had started.

To the believer in anything and everything, this was interesting reading; but, at the pop of the first gun, what become of these patriotic geniuses? Did they show up? Did any of them go to the front, and prove that they had really solved the great problem by destroying the enemy's army, or forts, or battleships? Did any of them destroy anything more than the paper upon which their boasts were written?

I believe that the Wright brothers, of Ohio, and Santos Dumont, of Paris, are working along lines that offer the most feasible means of mechanical flight; but there is a great field for practical experiment before them. Mr. Hiram Maxim spent much time and some thirty thousand dollars on a purely mechanical machine of the aeroplane type, and then threw up his hands by donating his work to the British Museum.

I have had many suggestions placed before me for mechanical flight, some of them with merit; but in each case there was no money for experiment. I believe that the government should hold a fund to be portioned out in the way of assistance to sincere inventors in this line, the same as is done in some foreign countries.

The experiment which Prof. Robert W. Wood and Otto Luyties, of Baltimore, are about to try, that of raising a vessel into the air by means of propeller wheels, is not new. The experiments of Hiram Maxim in England and Prof. Ritchell, of Connecticut, both of whom have given their experience in testing the pulling power of propeller wheels of large and small diameters, and at high and low velocity, were, as nearly as I can recall, about as follows: Hiram Maxim found that an 8-foot wheel driven at a velocity of 150 revolutions exerted a pulling force of about eight pounds, and Prof. Ritchell found that a 24-inch wheel at a velocity of 2,000 revolutions, exerted about the same pulling force, 8 pounds.

These tests do not appear to hold out much inducement to experiment along the lines of Prof. Wood and some others I know with similar ideas.

N. R. BRIGGS.

[Mr. Briggs does not mention the lift per horsepower, which is the criterion by which propellers are judged as to their efficiency. Prof. Wood has obtained a lift of 3 pounds with an 8-foot propeller driven at about 150 revolutions per minute by a 1-12 horse-power electric motor. This corresponds to 36 pounds to the horse-power, while 20 is a fair average. In Maxim's experiments it was found that a small, high-speed propeller was more efficient than a large slow-speed one, while Prof. Wood claims the reverse to be the case.—EDITOR.]

Solution to the Watch Problem.

The following is the solution to the watch problem which appeared in our issue of April 20 on page 335:

A watch derives its power of motion from the recoil of the mainspring, and the recoil is governed by the balance and lever. For instance, if it takes 24 full turns of the stem to wind the watch, and the watch runs 24 hours when fully wound, then for each turn of the stem it will run one hour. A more simple method is to hold the stem firmly between the fingers and turn the watch around. In winding the watch to run for one hour, the ratchet on the main spring will click, say, 30 times, which proves that this watch runs two minutes for each click of the ratchet which is attached to the main spring. We will suppose it was 12 o'clock noon when the watch was last wound up, and you now wish to know the time. Beginning to wind it up, you count the clicks, and find that before it is again wound up fully it (the ratchet) clicks 130 times. By dividing this by 30 we get 4 1-3, or 4 hours and 20 minutes, which added to 12 o'clock makes the hour 4:20 P. M. While watches are not all exactly alike, the principle is the same, and it is simply a case of mental arithmetic in order to be able to tell the time. But you must always remember the time of the starting point or first winding, and after that the time at the last winding.

The above was the method used by the poor old peasant, whose life mostly depended on his release, and who was immediately rewarded by the king with his liberty and a life pension.

Death of Sir Benjamin Baker.

Sir Benjamin Baker died on May 19 at Pangbourne, Berkshire, England.

He was born in 1840, and was undoubtedly one of the greatest engineers of the world.

The two engineering works by which he will be best remembered are the Forth Bridge in Scotland, and the Assouan Dam. Eiffel, the French engineer, declared the former "the greatest construction in the world." It is 2,765 yards long and cost $15,000,000. It is built on the cantilever principle and its main spans are each 100 feet longer than the main span of the Brooklyn Bridge. Its steel towers, 360 feet high, give 151 feet headway above the Forth at high water.

The Assouan Dam also cost about $15,000,000. It is a mile and a quarter long and raises the level of the Nile sixty-seven feet.

The dam is 120 feet high, and varies in thickness from 82 to 26 feet. Behind it, in a lake of 140 square miles, is stored water sufficient to insure the irrigation of the Delta in the dryest season.

For his work as consulting engineer of this great work Sir Benjamin received from the Sultan the First Class of the Order of the Medjidie. He had already been made a Knight of the Order of the Bath and of St. Michael and St. George. He received several honorary degrees from the leading universities of Great Britain, and was a Fellow of the Royal Society.

The Current Supplement.

The current SUPPLEMENT, No. 1639, opens with an article entitled "The Fate of the Temples of Philæ." Apprehension is felt by archeologists concerning the ultimate fate of the ruins of the temple as the result of the projected increase in height of the Assouan barrage across the Nile by 23 feet. The current SUPPLEMENT'S article presents an admirable study of the subject. The Census Bureau has just issued a report presenting statistics of women at work. This publication of nearly 400 pages is carefully digested, so that its more striking facts are readily available. A simple gas generator for laboratory use is described by W. M. Mills. "Ionic Therapeutics" is the title of a contribution in which the therapeutic effects of electrolytic treatment are graphically described. The problem of protecting concrete from freezing and thawing is one which has baffled the engineer. Mr. Richard K. Meade describes how calcium chloride may be used for the prevention of freezing. The demolition of the great wheel at Earl's Court, which for twelve years has formed so conspicuous a feature of the London landscape, involved engineering problems of no mean order. It was inadvisable to blow down the structure by means of dynamite because of the presence of neighboring buildings; accordingly, it was necessary to take the wheel down piecemeal. How the work was accomplished is very thoroughly described in a well-illustrated article. A history of the Wright brothers' aeronautic experiments is given by Octave Chanute. A good review of experiments on European systems of electric canal haulage is published. Prof. Alexander Graham Bell's paper on aerial locomotion is continued. For nearly eight months in the year the householder in the eastern parts of the United States is confronted with the problem of heat, ventilation, catarrh, and coal bills. The condition of the air breathed in dwellings and offices is, therefore, worthy of attention. Mr. Wilford M. Wilson throws a flood of light on the subject.

SOME UNKNOWN AMERICAN NATURAL BRIDGES.

BY T. S. PARSONS.

In the southeastern part of Utah, on the southwestern slope of the Blue Mountains, in San Juan County, which leads down to the Colorado River. In fact, all of the natural bridges of this region are in cañons leading down to the Colorado. The large bridges are in the very wilds of the continent, about one hundred and twenty-five miles from Yellow Jacket Cañon, Colorado, and one hundred and fifty-five miles from Cortez, Colorado, the nearest outfitting point for travelers visiting the region. Bluff, Utah, a small Mormon settlement, is a sort of relay place or half-way point on the journey, which must be made on horseback most of the way.

The Caroline Natural Bridge, San Juan County, Utah. Span, 250 Feet; Height of Arch, 183 Feet.

far from the main lines of travel and in a region almost inaccessible, are dozens of natural bridges varying in size from a few feet to hundreds of feet across. Three of the largest are shown in the accompanying pictures, and they may well be classed among the wonders of the world.

These three bridges are located within a radius of three or four miles, and many smaller ones are found within a comparatively short distance. The smallest of the three shown is a giant compared with the Natural Bridge of Virginia, with which every one is familiar.

On account of the distance from railroads and the difficulties encountered in making the trip, but few people have visited these curiosities, and their discovery being comparatively recent, but little is known about them. Only within the last year or two has anything like a scientific study been made of these peculiar formations. In 1905 Salt Lake City men visited the region, and the scientists of the party made an extended study of the structures and careful measurements as well as numerous photographs.

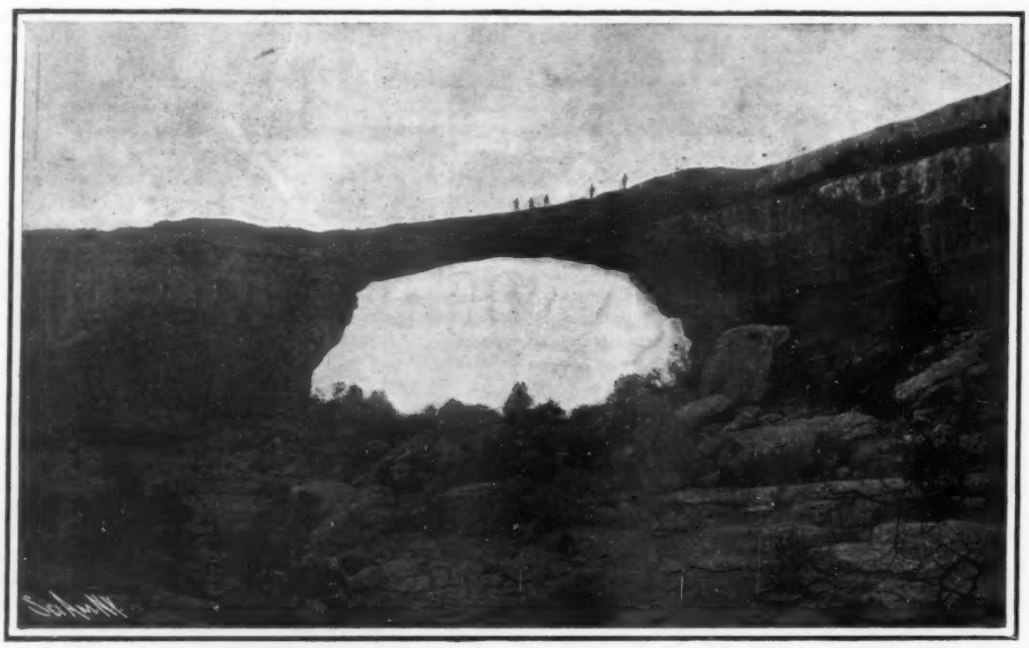
A picture gives but a faint idea of the magnitude of these gigantic structures, the largest of which is to the natural bridges of the world what the Grand Cañon of the Colorado is to the gorges of the world. It is claimed that the Augusta Bridge is the largest known natural bridge in the world; but Mr. Charles F. Loomis in his interesting book, "Some Strange Corners of Our Country," describes a natural bridge in Arizona that is large enough to contain a five-acre peach orchard upon its floor. Its structure is, however, radically different from that of the Utah bridges, so that it cannot be classed with them.

These three bridges are situated in the White Cañon,

The dimensions of the bridges, according to estimates and careful measurements that have been made, will give one something of an idea of their magnitude. The largest of the three, the great Augusta Bridge, has a span 320 feet and a height 348 feet, with a roadway on top 30 feet wide. The Natural Bridge of Virginia with its span of 93 feet and height of 215 feet is a mere pygmy compared with this giant of the Rockies. The archway of the Caroline Bridge has a span of 250 feet and a height of 183 feet. The smallest of the three is known as the Little or Edwin Bridge. Though called little it is far from being small with its span of 205 feet and a height of 121 feet to the top of the roadway that crosses it.

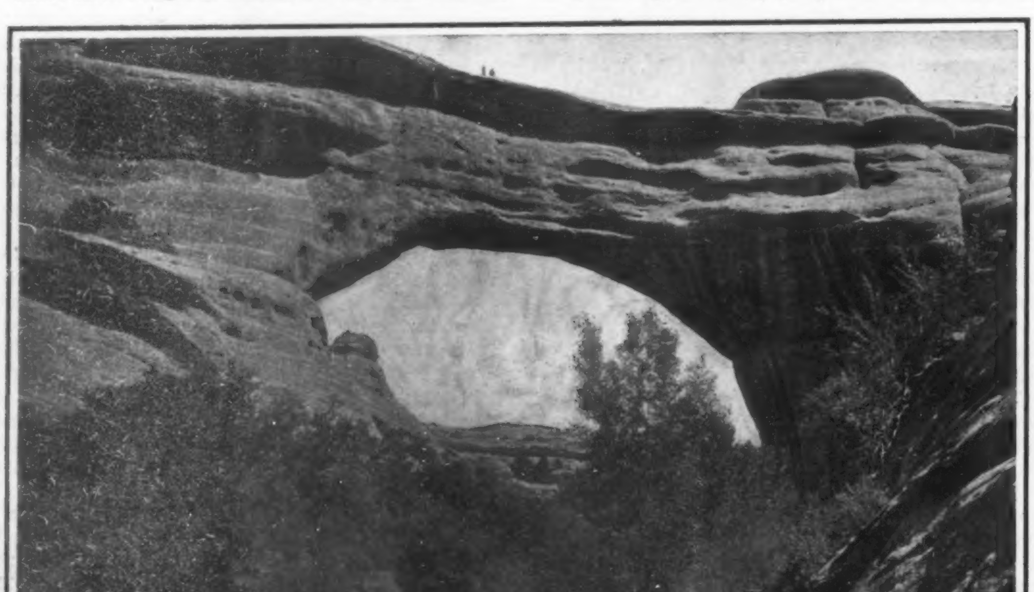
These bridges all span dry cañons, as the region is almost rainless, but this condition has not always held, as the ample evidences of erosion testify. The structure of the bridges is peculiar and interesting. They are dikes in a sandstone region, and these dikes may be traced across the mesas to other parallel cañons, where they form other natural bridges. The dikes themselves are a mixture of lime and sandstone, and the whole region overlies a limestone stratum, which in turn rests upon granite, as may be seen in the cañon of the Colorado River.

As one gazes on these mammoth structures he wonders how even Nature, that great architect, with only water as a tool, could accomplish such enormous tasks as these, and we wonder how many years were consumed in the building. No one knows. Conditions in this region were once much more favorable for water erosion than at the present time. For the formation of such structures as we find here it is essential that the limestone consist of massive, thick beds, comparatively free from alternating layers of sandstone or shale. Along the downward line formed by the intersection of two joint planes the waters slowly find their way. The waters are laden with acids, gathered from the air and from vegetation, which was once much more abundant in this region than now, and solution takes place slowly, forming what are called sinkholes. From these the solution works laterally along the planes of bedding, and often at several levels. Thus a region may become honeycombed with a network of vertical and horizontal passages. After these cavernous passages become large enough to permit the free flow of water, they may be enlarged and deepened by mechanical erosion. As the excavation progresses, the roofs of passages which lie near the surface are weakened and fall in. Thus some gorges originate, and wherever portions of the roof remain, the so-called natural bridges are formed. In the case of the Utah bridges, the dike structure probably accounts in a large measure for their immense size.



The Little or Edwin Natural Bridge, San Juan County, Utah. Span, 206 Feet; Height, 121 Feet.

There is another curious natural bridge in New Mexico. It has an arch of only about 60 feet span, but it is remarkable because it was carved, not by water, but by sand-laden winds, which are responsible for so many of the beautiful and fantastic erosions of the dry Southwest.



The Great Augusta Natural Bridge, White Cañon, San Juan County, Utah. Span, 320 Feet; Height, 348 Feet; Width of Roadway on Top, 35 Feet.

SOME UNKNOWN AMERICAN NATURAL BRIDGES.

The Japanese legation has, states the Brazilian Review, sent word to the Brazilian minister of foreign affairs that there will shortly arrive in Rio de Janeiro a large liner, belonging to a Japanese shipping company, which is fitted up as a floating exhibition of Japanese products.

A HOME-MADE BAROMETER.

BY S. LEONARD BASTIN.

To acquire a certain amount of weather lore should be the object of every gardener. All the changes which come about in the course of the year are so intimately associated with the well-being of plant life, that the elementary study of meteorology is a matter in which every horticulturist should engage. In this connection the possession of a fairly reliable barometer is essential. But in their cheapest forms the instruments are somewhat expensive, and considering that in essence the barometer is one of the simplest contrivances, it occurred to the writer that it would not be a very formidable matter to make one.

Inserting the Tube in the Mercury Receptacle

Filling the Mercury Tube.

As is we'! known, a barometer is nothing more than a contrivance for measuring the weight of the air. A glass tube closed at one end and filled with mercury, then immersed in a bath of the mineral without the admission of air, is an elementary form of the instrument. When the tube is upright, the column of quicksilver is seen to fall four or five inches, leaving a vacuum at the top. It will be evident that the height of the mercury in the tube responds to the variations in the weight of the atmosphere pressing on the bath of mercury. The relations of the movements of the "glass" to the weather are of course simple enough. When the atmosphere is heavy it causes the mercury column to rise, indicating fair weather; and conversely when the atmosphere is under low pressure the mercury column subsides, indicating the approach of a storm.

For the construction of a home-made barometer, purchase about three-quarters of a pound of mercury, a glass tube three feet in length and closed at one end, and a small glass receptacle four or five inches long. This should be large enough to take the end of the long glass tube, allowing a quarter of an inch or so all round. The wood necessary for the construction of the frame is likely to be found in almost any house. It is desirable that this work should be taken in hand in the first place. To make the frame take a board about three feet three inches long and four inches wide; make the whole nice and smooth. Now cut two strips of wood, say thirty inches long and one and a quarter inches in width. Screw these to the board far enough apart to allow the glass tube to be dropped in between them, at the same time taking care to place them four inches from the bottom of the board. Along the bottom of the board fasten a strip of wood sufficiently wide to support the glass receptacle. Add two pieces of wood to either side of the board, these to run up to where the two long strips terminate. In this way will be formed the three sides of a little box. A piece for the top of the box must have an archway scooped out in the center to allow for the passage of the tube. A square piece of thin wood may be cut to form the lid of the box. After applying some stain to give the wood a finish the frame is complete.

The next matter for consideration is the filling of the small glass receptacle and the tube with mercury. In filling the tube a funnel formed out of a sheet of paper will be found useful. When the tube is full, place the finger over the orifice. Then invert the tube, and without admitting any air immerse the end in the mercury contained in the receptacle This is likely to be rather a difficult undertaking, and perhaps the best way of all to accomplish it is to tie a piece of skin or leather very tightly over the upper end of the tube after it is full; then immerse, and finally cut away with a penknife the twine which binds the skin. If this has been accomplished without letting in any air, the column of mercury will be observed to fall several inches. If atmospheric bubbles are to be seen working their way upward, the tube must be refilled.

The tube and receptacle must now be carefully removed to the case. The contrivance is best fixed into its position by looping wire round the tube in about four places, and twisting these tightly at the back. The scale is easily prepared. Consult a reliable barometer in quiet weather, and when this stands at 30.00, make a slight mark in the woodwork opposite the level of the mercury in the home-made article. On a piece of paper rule out your scale for the two sides of the glass to the extent of about four inches; dividing each into tenths. Put the central inch at 30.00, and number the inches up and down accordingly. Paste the slips of paper on either side of the tube, and cover the receptacle with the lid which has already been prepared, and the instrument is complete. The barometer should be kept in an upright position, and must never be hung where the sun will fall on it. It is not claimed that this contrivance will work with extraordinary accuracy, but if reasonable precautions are taken in its construction, the instrument should record the variations in pressure with fair reliability.

Reliable English authorities place the world's production of spelter during the year 1906 at 688,300 tons of 2,240 pounds each, showing a slight increase over the 647,720 tons produced in 1905. Of the total production of 1906 Europe is credited with 491,045 tons, of which Belgium produced 150,060 tons; Rhine, 67,615; the Netherlands, 14,420; Great Britain, 51,670; France and Spain, 52,940; Silesia, 134,180; Poland, 9,460, and Austria and Italy, 10,610. Australia produced 1,010 tons, and the United States outranked any other nation, her production amounting to 196,545 tons, as against 180,360 tons in 1905. Besides producing the largest quantity of spelter, America showed the largest increase of any of the producing countries.

American Grain Losing Ground.

At a recent meeting of delegates representing all the leading grain dealers of Europe, it was decided that no decisive action would be taken at present with regard to grain trade with the United States, the delay being for the purpose of giving American exporters an opportunity to improve existing conditions, and to afford them time to make a thorough investigation of the complaints of European dealers. If, however, no improvement appears within a reasonable time, it is declared that an absolute boycott of American grain will be instituted. Even at the present time there is absolutely no sale for American grain in many localities, this being especially noticeable in the Rhenish - Westphalian district, where Argentinian wheat has taken the place formerly held by that from the United States.

At the meeting referred to, many cases were cited where American grain arrived in extremely bad condition, being moldy and not grading to sample, and in a number of instances bordering very closely upon swindling. Formerly there was a most flourishing trade in all American grains in the Rhenish-Westphalian district.

The Platinum Deposits of California.

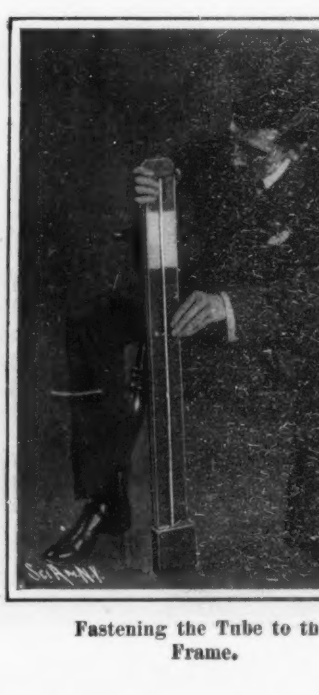
Members of the U. S. Geological Survey, who are now in San Francisco, are investigating the recent discoveries of platinum in several counties in California. A bulletin will soon be issued on the tests of black sands which were conducted on the Pacific coast and elsewhere more than a year ago. The inquiry was started originally for the purpose of locating rich deposits of platinum. The investigation developed that there is platinum in 120 places in the United States; but that some of the largest and most profitable fields for commercial exploitation are in Del Norte, Siskiyou, and Trinity counties, in California. Platinum is also found in considerable quantities in Plumas and Butte counties.

A tin mine in the extreme north of the province of Kwangsi, China, is operated on a small scale, its product being exported through the port of Wuchow. Another tin mine is to be opened in the prefecture of Wuchow.

The Mercury Tube Inverted.

The Tube Immersed in the Mercury Receptacle.

The Scale in Place.



Fastening the Tube to the Frame.

A HOME-MADE BAROMETER.

THE WONDERFUL SULPHUR MINES OF LOUISIANA.

The extraordinary richness and extent of the mineral resources of the United States are proverbial, and all things considered, in the whole range of the mining industry it would be impossible to find a deposit which, relatively, in its richness and purity exceeds the sulphur mines of Louisiana. These are unique both in their geological formation and in the originality and daring of the methods adopted for the recovery of the metalloid.

The deposits in question are situated near the little town of Lake Charles near the coast of the Gulf of Mexico, and close to the border between Louisiana and Texas. They belong to the Union Sulphur Company, to the untiring patience and inventive skill of whose president, Mr. Herman Frasch, is due the present ingenious and very successful method of recovery. Before proceeding to a description of this method, it is necessary to make clear the character of the deposits and the probable method of their formation. The large number of boreholes which have been sunk have revealed the presence, at great depth, of a vast extinct geyser, whose operations must have ceased far back in geological ages, the sulphur layers having been deposited in the tertiary age, either Eocene or Miocene. After passing down, first through 200 feet of clay and then through 200 feet of quicksand, and 80 feet of sand and gravel, the drills revealed the presence of a vast cone or mountain of limestone, approximately oval in form, the lip of the cone having a width of about 200 feet, and the mouth measuring from one-third to one mile across. A portion of the top of the cone is covered by a deposit of broken limestone, which varies in thickness from nothing to 150 feet, at the edges. After the drills had penetrated through this overlying stripping, they entered a huge deposit of sulphur and limestone, consisting of about 30 per cent of limestone and 70 per cent of pure sulphur. Below this was found a deposit of gypsum 450 feet in thickness, and underlying the gypsum is a deposit of salt. Surrounding and covering the walls and summit of this cone, with its valuable contents, is a bed of sand.

The discovery of this mine resulted from the efforts of a company which was formed in 1868 to search for petroleum, the presence of which was indicated by oozings from the surface of the ground. Two years later, attempts were made to extract the sulphur which the borings for petroleum had revealed; but the impossibility of controlling the abundant sub-surface waters of this region, which is almost at sea level, rendered all attempts to recover the sulphur by the ordinary mining methods abortive.

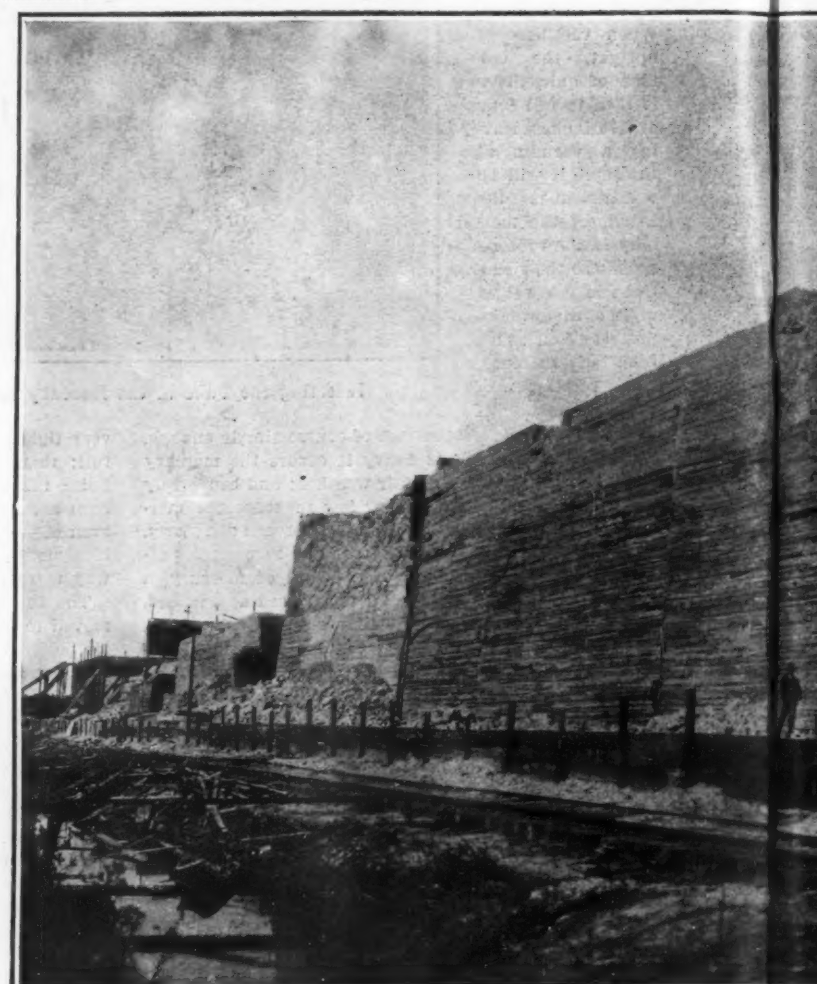
The present successful system may be said to date from the year 1891, when the first patents on a process for recovering sulphur by liquefaction were taken out; but it was not until the year 1895 that the inventor succeeded in securing the property containing this deposit, and not until seven years later that the many difficulties in the way of mining the sulphur in this novel manner were overcome and the process brought to a state of perfection which made the new method a financial success. The quality of the product of the Union Sulphur Company is excellent, showing upon analysis a purity of more than ninety-nine per cent.

Briefly stated, the sulphur is melted by means of superheated water which is forced down into the deposit through iron pipes. The melted sulphur, being insoluble in water, and of greater specific gravity, falls to the bottom of the well, whence it is raised to the surface by means of an air pump. On the surface it is allowed to congeal in the form of huge square masses, and subsequently is broken up and loaded on to the cars for shipment.

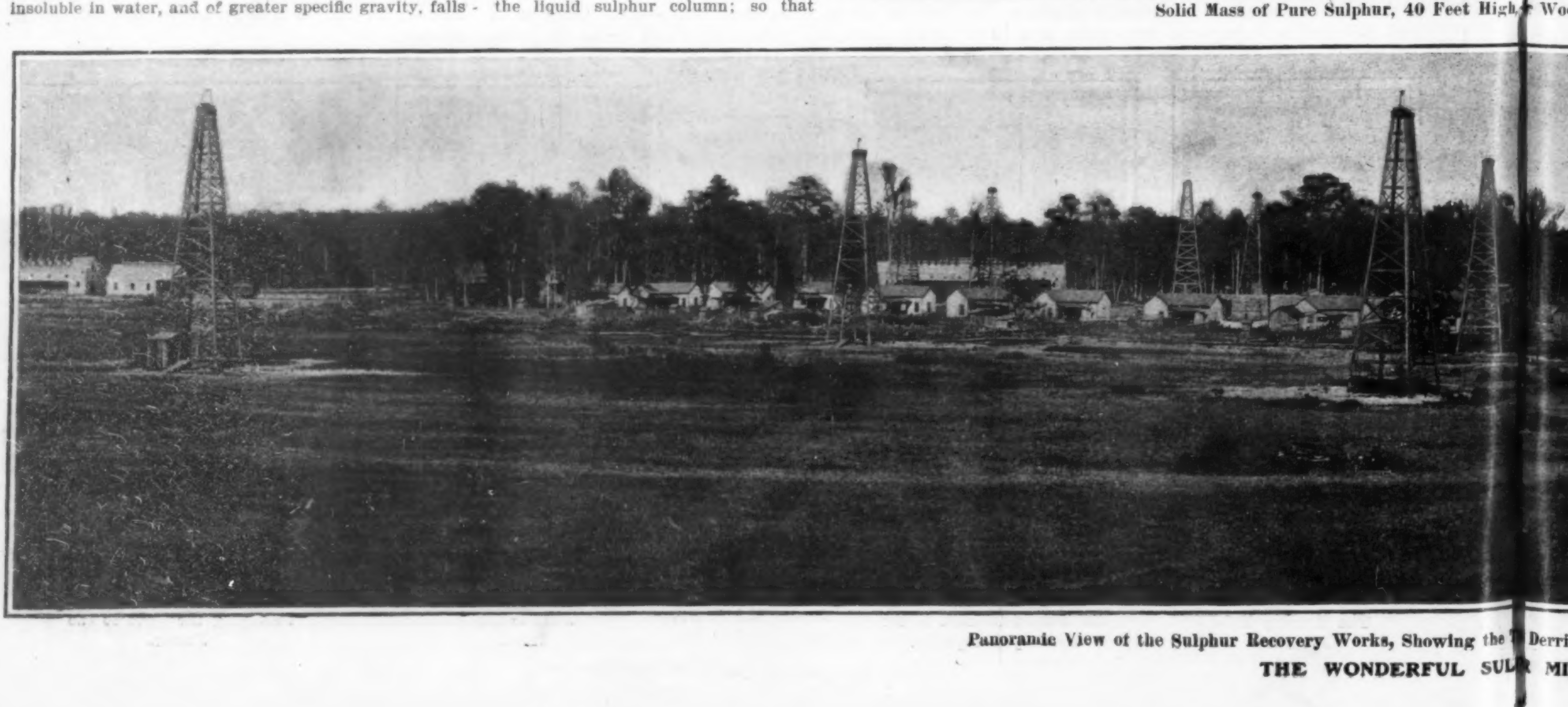
The details of the process are as follows: A well is drilled in much the same way as for petroleum, to the bottom of the sulphur bed. Down this well is run a system of pipes, one within the other, until it extends not quite to the bottom of the well. The outermost pipe is 10 inches in diameter; within this is a 6-inch pipe, inside of which is a 3-inch pipe, and within that a 1-inch pipe. Water, heated in a battery of boilers to a temperature of 335 deg. F., is forced down through the annular space between the 10-inch and the 6-inch pipes, and issues through a number of perforations in the side of the pipe at a point two or three feet above the bottom of the well. The water, because of its great heat and pressure, forces its way through the seams and crevices of the limestone rock, attacking and melting the sulphur, and causing it, because of its superior gravity, to drain down to the bottom of the well. Here it enters the bottom of the pipe through a number of perforations, and passes up through the annular space between the 6-inch pipe and the 3-inch pipe. Normally, the two columns of liquid, water and sulphur, would stand in equilibrium at different levels, whose height would be inversely as their respective specific gravities, the water column being twice as high as the liquid sulphur column; so that

Wall of Sulphur, Showing a Pocket of Liquid Sulphur Long After Exterior of Mass Had Solidified.

Breaking Down and [illegible]ling

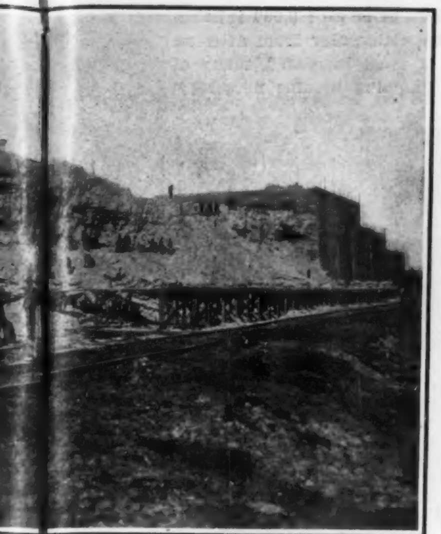


Solid Mass of Pure Sulphur, 40 Feet High, [illegible] Wo

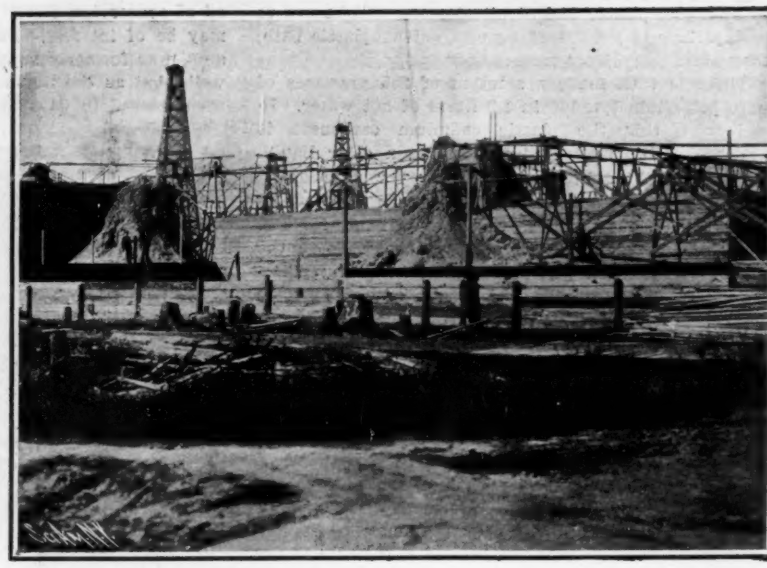


Panoramic View of the Sulphur Recovery Works, Showing the [illegible] Derri

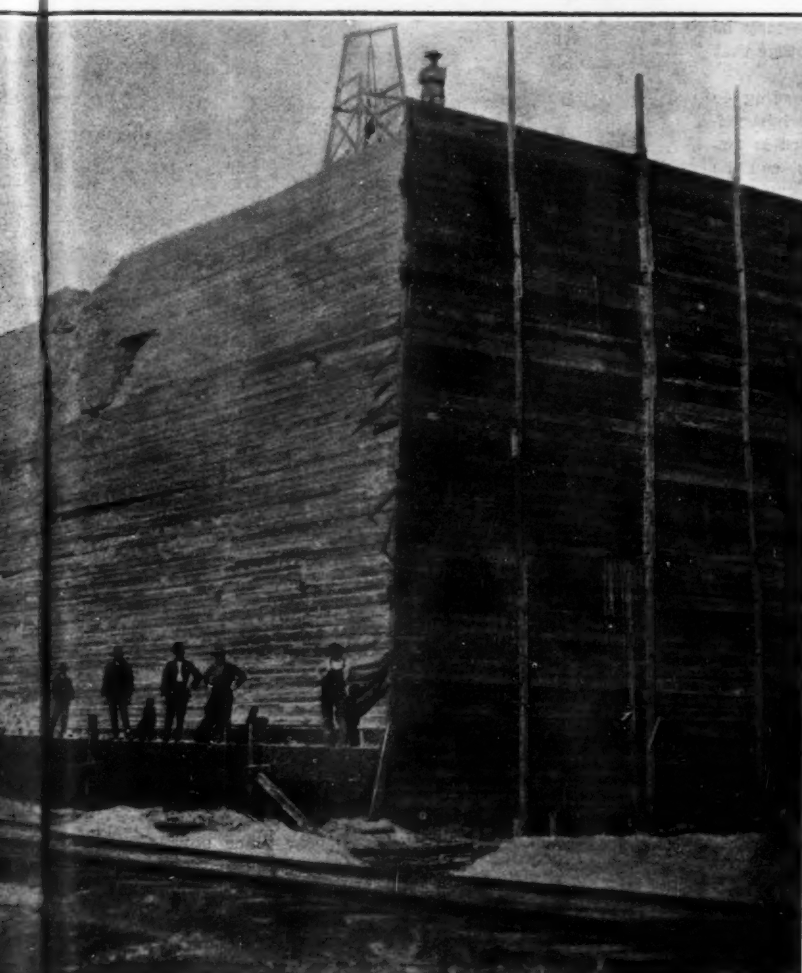
THE WONDERFUL SUL[illegible] MI



and ling a Deposited Bin.



Three Wells Pumping Sulphur Into a Bin 250 Feet Wide by 350 Feet Long.



ligh r Wooden Walls of Bin Had Been Removed.

when the top of the water column was at the level of the ground, the top of the liquid sulphur column would be at a point halfway between the bottom and the top of the pipe. In order to bring the sulphur to the surface, compressed air is forced down through the 1-inch pipe into the liquid sulphur, and the density of the latter is thereby reduced, until it is less than that of the water, and the mixture of sulphur and air rises and flows out in a steady stream at the surface, as shown in one of our illustrations.

From what has been said above, it will be understood that the radius of action of the hot water, as it issues from the bottom of the tube, will be dependent upon its pressure and heat. That is to say, it will extend through the seams and fissures of the limestone rock, melting out the sulphur, just as far and just as long as it can maintain its heat above the melting point of the sulphur. As the sulphur, because of its greater specific gravity, drains away to the bottom of the well or pump, the water takes its place, although, of course, there is a gradual subsidence of the ground to fill the voids thus produced. From 400 to 500 tons of sulphur have been known to flow from a well in a single day, this rate being maintained for weeks at a time, and one well has actually furnished over 60,000 tons of sulphur. The wells are sunk at distances of from 50 to 100 feet from each other, and in this way this enormous deposit is being gradually exploited. The subsidence of the ground, as might well be imagined, is on a colossal scale, the surface having sunk over a large area to an average depth of 30 feet. The mere work of filling in this depression is no small task, hundreds of carloads of dirt having been hauled for this purpose.

Since the liquid sulphur comes to the surface over 99 per cent pure, it is not necessary to subject it to any treatment to prepare it for the market. Consequently, it is allowed to flow into large open bins built on the ground, areas measuring about 250 by 350 feet being bulkheaded in with timber for this purpose. The bins are of sufficient area to permit the layers to cool, as the sulphur flows into them, the layers forming and cooling first on one side of the bin and then on the other. In this manner a monolithic mass of pure sulphur, from 40 to 50 feet in height, is formed. The sulphur bins are intersected by tracks; and when a shipment is to be made, the boards surrounding the mass are taken down, and the wall of sulphur is broken up by laborers and wheeled into the cars.

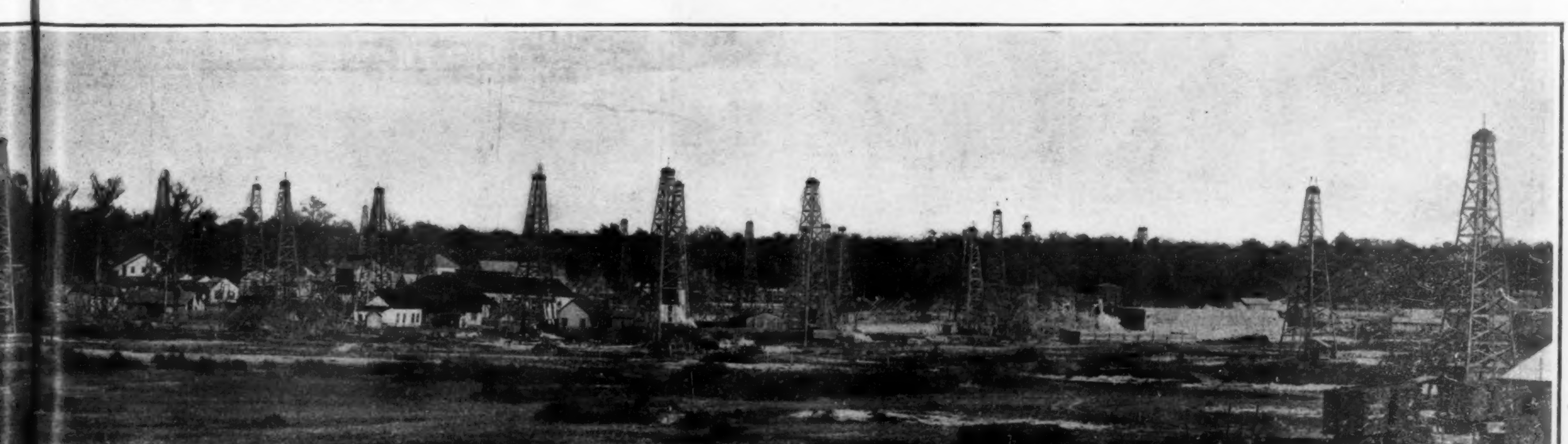
The illustration giving a general panoramic view of the plant shows thirty of the derricks by which the wells were driven, and several of the large boiler plants for producing the superheated water. Although the driving of the wells and putting down of the tubes is a large item of expense, the principal cost, of course, is the production of the enormous volumes of hot water, for which latter purpose a total of 24,000 horse-power of boilers is at the present time employed. Nevertheless, the sulphur rock is so extremely rich, the deposits of such vast extent, and the output so large and of such pure quality, that the Louisiana sulphur mines to-day are a great factor in the sulphur markets of the world. The annual consumption in the United States and Canada is about 200,000 long tons of elementary sulphur, and until the last few years the production of domestic sulphur averaged less than one per cent of the total consumption. In 1902 the domestic production of elementary sulphur was 7,433 long tons, and our importation 174,939 long tons. From these figures it can be easily seen that the United States, until very recently, has depended on Europe for the bulk of its sulphur supply. The successful development of the Louisiana mines, however, has put this country in a position to meet the entire domestic demand, and the Union Sulphur Company is in a position to place its product in the European markets in competition with the great sulphur mines of Sicily, which have hitherto been the main producers for the whole world.

Electroplating With Cadmium.

As cadmium can now be had at a reasonable price, it may be of interest, says a writer in the Deutsche Metallindustrie Zeitung, to know that there may be obtained an absolutely satisfactory plating therewith by galvanic deposition. Up to a recent date, however, attempts in this direction met with no success.

Cadmium is soft, has no caustic action, does not readily dim under the action of vapors containing sulphureted hydrogen, and its color is as white as that of tin, although not so white as that of silver. As compared with the latter metal, however, the galvanic deposit is harder and permits a higher polish.

Experiments show that for this purpose a solution of cadmium carbonate is best, and that the most favorable results may be obtained by the employment of such a solution. To make this latter, a solution of any soluble cadmium salt in water is treated with sodium carbonate. Cadmium salts are to be had in the



the Derricks by Which the Pipes Are Sunk to the Sulphur Deposits.

SUL MINES OF LOUISIANA.

market, or one may make them from the metal. If the metal be used, the following process is employed: 85 grammes of metallic cadmium are dissolved in a mixture of 2,180 grammes of concentrated nitric acid and 10 of water in a glass or porcelain vessel. When all the metal is dissolved, 2.3 liters of water must be added and the whole heated to the boiling point. There is then made a solution of 453 grammes of sodium carbonate (washing soda) in 2.3 liters of hot water, and this solution is added in small quantities to that of the cadmium, while constantly stirring the mixture. There will be a white precipitate of cadmium carbonate. Sodium carbonate is added until no more cadmium carbonate is deposited. In this condition the solution will show an alkaline reaction. It is then allowed to settle; the white cadmium carbonate will rest on the bottom. The liquid above is to be decanted and thrown away. The vessel is now to be filled with hot water, and all well stirred and then let stand. The clear liquid should be poured off, and hot water again added. When the precipitate has settled and the liquid is decanted off the third time, the white cadmium carbonate which remains on the bottom of the vessel is washed five times with hot water and filtered. In order to thoroughly wash the precipitate, it is necessary to decant the liquid thoroughly therefrom before fresh water is added. If this is not done, the impurities remaining in the solution will only be diluted, not washed out. The object of the thorough washing is entire removal of the sodium nitrate formed as a precipitate; and as nitrates are well known to be injurious to good working of a galvanoplastic bath, they must be entirely removed.

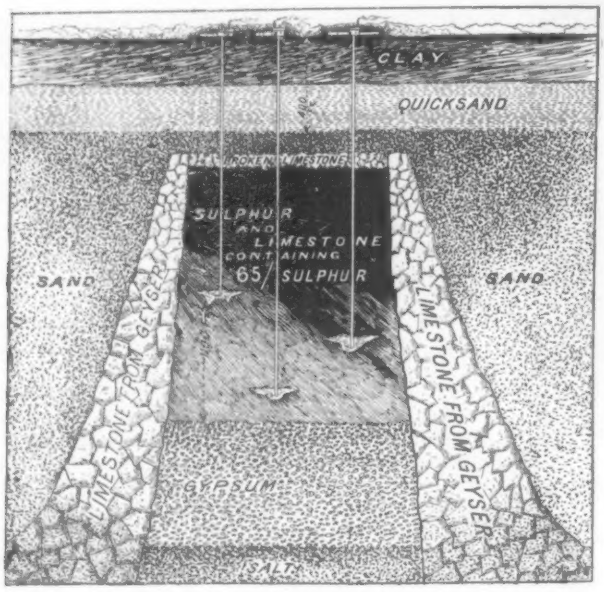
There is then made a solution of 255 grammes of pure potassium cyanide in 1.2 liters of hot water. In this the plastic cadmium carbonate is dissolved, rapidly forming a clear liquid. The solution is next, by the addition of about 3.4 liters of water, brought up to about 4.5 liters, and is then ready for use. The proportions of the substances in the solution will be: Water, 4.5 liters; potassium cyanide, 255 grammes; cadmium, 85 grammes. The solution should show a density of about 8 deg. Baumé.

If necessary, there may be used instead of metallic cadmium, the chloride or the sulphate of the metal. This may be dissolved directly in water. They are then precipitated with washing soda, but a greater quantity thereof must be taken. Where the chloride is used, there must be employed about 170 grammes, as it contains only 50 per cent of cadmium. If the sulphate is employed, 595 grammes must be used, because this contains only about 1/7 its weight of metallic cadmium.

Commercial cadmium carbonate may be employed; but it has the disadvantage that it is not very soluble.

The cadmium bath, made according to the above formula, is clear and bright yellow in color. For the anode there is employed a cadmium plate. This can be made by melting cadmium and pouring it on an iron plate, or by rolling the metal into a sheet. Both the cast and the rolled anodes give good results.

When the above solution is used for electroplating, there may be obtained a faultless deposit with either a cold or a hot bath; but the brightest and firmest deposit is obtained when the temperature of the solution is between 50 deg. and 65 deg. C. (112 deg. and 149 deg. F.).

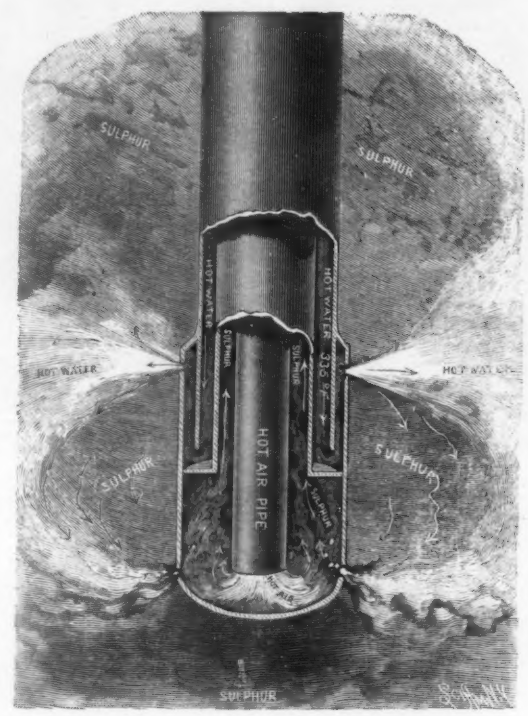


These deposits are contained within the mouth of an extinct geyser which in the course of geological ages was buried in sand, quicksand, and clay. The sulphur is melted out of the limestone rock by forcing down enormous volumes of superheated water, and then in the liquid state raised by compressed air to the surface.

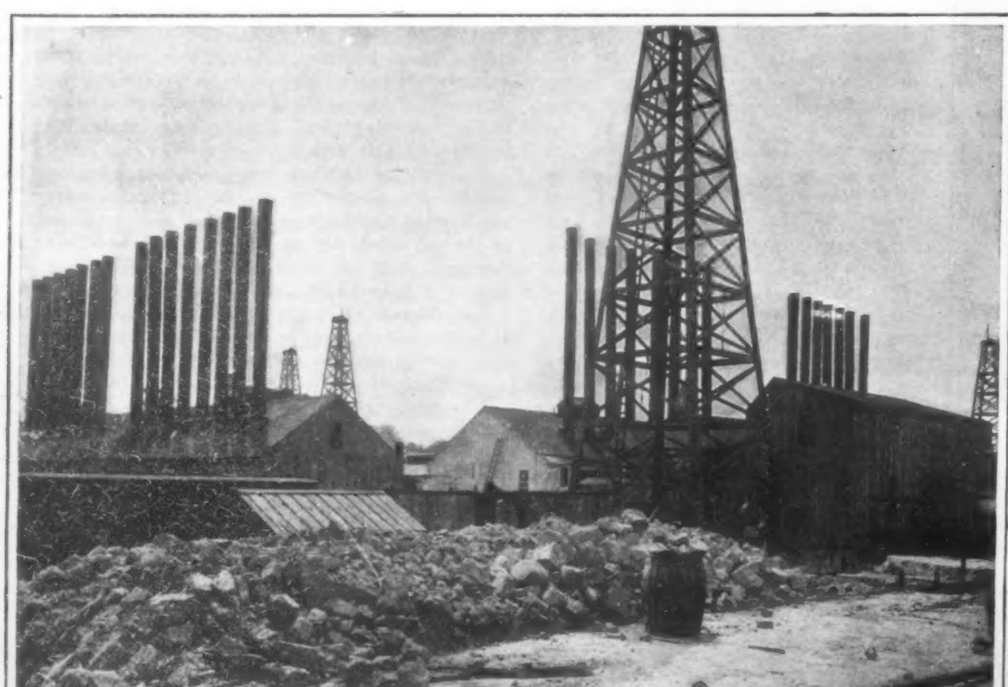
Approximate Section Through the Sulphur Deposits of Louisiana.

Novel Method of Conserving Storm Waters in Southern California.

At this time, when enormous sums are being expended for the storage of storm waters and the construction of various irrigation projects, the novel method of conserving storm waters in Southern California may be of interest. Pomona, a city of 8,000 inhabitants, was formerly supplied with water from artesian wells, but as the number of these increased, many of them ceased to flow, and pumping became necessary. Since that time many more wells have been sunk and pumping plants established, which caused the water level to fall, during the irrigating season, to 80 feet below the surface. A tunnel was driven nearly 7,000 feet into a gravel drift above the wells, until now the end of the tunnel is 125 feet below the surface. The water in the tunnel diminished as that in the wells lowered, even though a number of flowing wells were obtained in the bottom of the tunnel. Four years ago the winter flood waters from San Antonio Canyon, about four miles distant from the tunnel, were diverted from their course and spread over the rocky land above the head of the tunnel. A stream of several thousand inches, when "fanned out," disappeared within a few hundred yards and about two miles from the tunnel. The following September the water level in the wells below rose several feet, and the flow from the tunnel was materially increased. Title was then secured to 6,000 inches of storm waters, and each year the spreading of storm waters has been systematically carried on. The cost is small, two men doing the entire work. The water level, which falls as a result of pumping operations during the early summer months, has risen during September each year since storm waters have been spread. The average height of water in the wells has risen many feet, and the flow from the tunnel has increased to such an extent that the city now derives its entire domestic supply from that source. A number of wells are now flowing for the first time in ten years. This flooding begins usually in December and continues until May or June, depending on the amount of rainfall during the winter months.



Section Through Bottom of Pipe of Sulphur Well.



General View of a Small Part of the Wells and the Boiler Plant for Producing the Superheated Water.

The Pure Liquid Sulphur is Forced Up Through Pipes and Flows Into Huge Vats Where It Solidifies.

THE WONDERFUL SULPHUR MINES OF LOUISIANA.

RECENTLY PATENTED INVENTIONS.

Pertaining to Apparel.

AUTOMOBILE-CAP.—C. K. LIEBESKIND, New York, N. Y. The cap is especially adapted for automobiling and similar exercises, although capable of several uses. Means are provided by which the wearer can protect the face and eyes, and be afforded a clear vision of objects at the front. Ventilation of the cap is secured without causing a direct draft upon the wearer's head.

Electrical Devices.

HIGH-TENSION INSULATOR.—L. STEINBERGER, New York, N. Y. The more particular object of this invention is to produce a type of high-tension insulator suitable for heavy currents and adapted to prevent arcing from the line to the support under conditions where such arcing might otherwise take place. Mr. Steinberger also provides a plurality of supporting portions for the conductor, and also means for supporting simultaneously, a plurality of conductors upon the same insulator.

HORIZONTAL SUPPORT FOR CONDUCTORS.—L. STEINBERGER, New York, N. Y. By means provided in this patent sawing action due to longitudinal movement of the cable in direction of its length is unable to cause abrasion of insulating material, as all wear is taken up by the wearing plate. Should the cable break, the slack cannot extend farther than the two insulators on opposite sides of the break. Means provide, if desired, for adjusting the cable. In case of strain of cable, while sustained ultimately by the insulator, it need not in every instance be upon the same identical part of the insulator, but may be distributed to advantage to increase the strength of the insulator.

INSULATING DEVICE.—L. STEINBERGER, New York, N. Y. The invention provides an insulator pin containing an insulated strengthening member embedded therein; increases mechanical and dielectric strength of the member, and renders the pin water-tight at its base. Provides a water-shedding course for conveying moisture away from the pin and cross-arm, and increases insulating qualities of the pin and its parts. Maintains the arm comparatively dry adjacent to the hole in the arm. Holds the pin on the arm and carries off the water running down the pin to either side and away from the arm.

ELECTRIC PUMP.—W. LAMBERT, Sunnyside, Wash. The invention has reference to pumping mechanism, and more particularly to electric machinery used for actuating a pump. It further relates to means for automatically throwing the pump and the electric mechanism out of action when the water in the tank reaches a predetermined level.

ELECTRICAL ADVERTISING-CLOCK. — J. H. MELCHERS, Decatur, Ill. A window in the clock case has behind it a flexible advertising strip, which is intermittently moved to expose the advertisements in regular succession, the rolls for carrying the strip being connected with and operated by electro-magnetic devices set into action by a circuit closer under control of the clock, which at intervals shifts the advertisements; mechanism being also provided by which, when the strip is completely unrolled from one roll and wound on the other, the direction of motion of the rolls is automatically reversed, so as to send the strip back again in the opposite direction.

Of Interest to Farmers.

DISK CULTIVATOR.—A. JOLLY, Seward, Kan. The object in this improvement is to provide a drag frame adapted to support a frame upon which disk gangs are mounted, and to adjust the gang frame and disk frames vertically relatively to the drag frame; to provide means for adjusting the inner ends of the disk gangs vertically and horizontally, and also to provide shields adapted to travel between the center disks of the gangs.

HAY AND GRAIN LOADER.—A. S. JOHNSTON, Belgrade, Mont. The aim of the inventor is to provide a device for loading shocks of hay and grain from the field into a hay rack drawn by the machine, and to so construct the machine that the fork can be elevated and dumped at any desired time and in an expeditious and convenient manner, to deposit the shocks either in the front or rear portion of the hay rack.

Of General Interest.

SIGNAL. — C. P. RUGGLES, Osawatomie, Kan. The invention refers to signals, especially to signal flags. The object is to produce a signal carrying several flags, any of which may be quickly brought into view when desired; a further object being to construct the parts so as to enable the signal flags to be readily removed when using the same as an ordinary signal. It constitutes an improvement of the invention described in an application formerly allowed to Mr. Ruggles for a signal.

WIRE-STRETCHER. — F. W. REICHERT, Granton, Wis. This inventor utilizes a screw for the purpose of applying power to the desired purpose, the construction having the advantage that it possesses great power, will not slip, and can be reversed so that it can be used from either side, and accordingly the screw does not have to be turned back every time it is used, but the stretcher can be simply turned over for the next operation, the wire being attached to the opposite end of the screw, which can then be operated in the reverse direction.

NON-REFILLABLE BOTTLE.—A. PAROUTAUD, New York, N. Y. The stopper in this bottle is specially constructed for preventing refilling of the same, and is made a permanent part of the bottle's neck. Among the objects of the invention is to provide a stopper that is practical to manufacture, especially of such materials as glass, porcelain and the like, and to prevent the refilling of the bottle as when inverted, by pressure or infiltration.

WOVEN PILE FABRIC.—W. A. MINIFIE, Little Falls, N. J. The invention pertains to carpets of the tapestry, Brussels or velvet type, and its object is to provide a fabric which has an exceedingly strong and durable body and in which the pile threads are securely bound in place. In weaving the fabric a special tension device is required for taking up the slack which would naturally occur in the binding warp.

SWIVEL ROPE-SOCKET FOR WELL-DRILLS.—O. E. LINDHOLM, Roy, Ter. of New Mex. In drilling, the cable is under strain when lifting the drill tools, and hence it then untwists to a certain degree so that the drill is turned correspondingly; but when the drill drops, the cable being more or less slack, it twists back or resumes its full twist. A swivel is introduced between the cable and the drill, and when the weight of the drill tools is imposed on the cable, the friction of the swivel prevents it from acting, that is, rotating, but when the weight is released, the swivel turns readily. The swivel is for practical use for this purpose.

IRON-FENCE CONSTRUCTION. — J. B. LINDENSCHMIDT, Evansville, Ind. The invention relates to improvements in the construction of iron fences containing posts supported on a cast iron base, whereby longitudinal rails are supported which carry pickets or other equivalent members, to fill in or close intermediate spaces. It also relates particularly to means for securing the posts to cast iron bases whereby rusting at the bottom of the posts is reduced to a minimum.

DIGESTER-COVER. — G. D. HUNTINGTON, Watertown, and A. R. O'NEILL and F. P. NOONE, Potsdam, N. Y. The improvement refers to apparatus for making paper by the sulfite process, and the aim is to provide a cover or door for the acid tanks of sulfite digesters, and arranged to prevent a jointless surface to the acid in the tank, with a view to prevent quick destruction or deterioration of the cover body by the action of the acid in the tank.

EDUCATIONAL APPLIANCE.—V. BÉTIS, 10 Loris road, Shepherd's Bush, London, W. England. This educational appliance is designed more particularly for kindergarten work and whose general character is that of a counting frame in which is arranged a plurality of units in the form of cubes or blocks of any shape, bearing each a plurality of letters, figures, colors, or other differential faces, susceptible of the various grouping or arrangements required by such work.

FENCE.—J. E. TYLER, Roxobie, N. C. The invention refers particularly to posts having a concrete base and a wooden or similar standard. This base may, if desired, be reinforced by wires extending longitudinally within the post and disposed laterally and having their ends coiled or deflected. The wooden standard is held clear of the ground by the base in order to retard decay and thus lengthen the life of the standard.

HOLDER FOR GRAPHOPHONE-CYLINDERS.—W. KRENRICH, Bloomfield, N. J. The holder is of skeleton formation. Its arms coming in contact with inner faces of the cylinders are of spring material, secured at one of their ends to a support, and the arms are curved where they connect with the support and frame, thence substantially straight with slight outward inclination and free at their lower ends, whereby as a cylinder is slid over a holder the arms are pressed inward and brought in close frictional engagement with the cylinder throughout the length of their straight sections, and the cylinder is held from lateral displacement, yet readily removed from the holder without danger of damage.

SHAVING-CUP.—S. ATTANASIO, New York, N. Y. The intention in this case is to provide a cup capable of being readily and thoroughly cleansed, and provided with means for isolating the soap from the water, thus preventing impregnation of soap with water used in previous shaving; also for holding the soap firmly in position in the cup.

WEIGHING - SCALE. — A. CHRONIK, New York, N. Y. The invention pertains to measuring instruments, and its object is to provide a scale, more especially designed for accurately and quickly weighing small quantities. The weighing scale is very simple and durable in construction, and permits the accurate weighing of exceedingly small quantities.

Hardware.

BRACE.—J. HOLLEY, West Palmbeach, Fla. The operation and action of the new brace is substantially the same as that set forth in the Patent Number formerly granted to Mr. Holley, but by mounting a tool carrier and guard upon the crank arm rather than by providing a separate shaft therefor, the device is rendered much simpler and less costly. To remove the carrier, it is merely necessary to withdraw the pin of the crank arm, and the tool carrier may then be readily and quickly removed.

SHEARS.—J. COOK and J. F. BRADY, New Paynesville, Minn. The shears are designed more especially for cutting tin and other sheets of metal or tough material. The lower blade is formed with a laterally and rearwardly bent arm which lies in a horizontal plane at right angles to the normal plane of the blades and which serves to balance the shears and support the tin while it is being cut.

GATE OR DOOR LATCH.—J. S. BROWN, Ohiowa, Neb. The invention refers to latches such as used on gates or doors, and the object is to produce a simple latch which will operate to hold the door or gate in an open as well as in a closed position. The inventor provides a construction which will enable the gate or door to come close to the fence or wall in which it is placed, when latched in its open position.

Household Utilities.

DRYING-HANGER.—C. F. SCHILD, Cambridge, Ohio. The invention relates to hangers or brackets adapted to be attached to a wall adjacent to a range, or at any other convenient place, and upon which towels or similar articles may be suspended for drying. The object is to provide a device that may be drawn out or elongated as occasion may require, and that may be turned to any desired position.

FIRE DOG OR ARM.—L. C. ROSS, West Point, Miss. The invention relates to improvements in fire dogs designed for use in open fireplaces, and the object is to provide means for holding the burning wood in the fire place and preventing its falling out of the hearth; also to provide means for heating irons or other articles by the fire. The inventor combines two fire irons or dogs with a connecting plate upon which irons, etc., are to be placed to be heated.

Machines and Mechanical Devices.

MACHINE FOR MAKING FENCE-POSTS.—R. L. DENNISON, Kansas City, Mo. In the present machine are embodied many features of the machine illustrated in Mr. Dennison's former application for patent, and it involves in addition certain improvements. Thus he employs in connection with the main frame, a carrier to which mold boxes are secured, and which carrier revolves around a central main shaft, which is hollow, and forms a pump cylinder in connection with a plunger connected with a former and reciprocating therewith in the operation of the invention.

THUMB-NOTCH INDEXING-MACHINE. — E. JOHNSON, Milwaukee, Wis. In this patent the improvement relates to indexing machines, the inventor's more particular object being to produce a device in which the leaves of books may be readily cut so as to produce the indentations designated as "thumb-notches," whereby the different portions of the book may be readily accessible to the reader.

SAW-SET.—J. V. STROMBOM, New York, N. Y. The object in this instance is to furnish a device in which a plurality of teeth may be set at each movement of the operating handle, and which may be so adjusted as to permit of its being used with saws of any sized teeth, and permit of the teeth being set to any desired extent either by varying the amount of the tooth which is bent, or varying the extent to which it is bent.

RIBBON-FASTENING MACHINE.—A. M. MAGEE and W. N. EARLE, St. John, New Brunswick, Canada. The invention refers to improvements in ribbon roll securing devices, and comprises a clamp having a tension bar pivoted thereon. The objects are, first, to provide a more perfect fastener for ribbons contained in roll than is now known, and secondly, a fastener that will readily permit of the unrolling of the ribbon when desired.

EXHIBITING-REEL FOR MUTOSCOPES.—E. W. LIVERMORE, Bellingham, Wash. The object of the inventor is to represent to the view a number of specimens of the eggs of fishes or animals of the lower order, and representing the same in successive stages of development, from the egg to the fully developed young creatures. More especially, the object is to provide a reel, together with its accessories, which may be readily set up in a mutoscope of ordinary construction and such as are now used for exhibiting a succession of pictures.

RAZOR-STROPPING MACHINE. — E. G. KAUFMAN, Yonkers, N. Y. The purpose of the invention is to provide a machine more especially designed for stropping ordinary handled razors, and arranged to permit the operator to readily rock the razor blade on alternately pulling the ends of the strop and without danger of binding of the working parts, and to insure a proper contact of the cutting edge of the razor with the runs of the traveling strop.

WHEEL.—W. R. CALDWELL, Keyser, West Va. The invention is an improvement in power wheels, which may be utilized as paddle wheels for boats, or as propelling wheels for aerial machines, or for other purposes where power wheels may be desired. It may be desired to arrange the rail to hold buckets open, in which construction the rollers would be adjusted to bear against the outer side of the rails instead of the inner, the rails being correspondingly disposed.

MEASURING DEVICE.—O. CAVIGLIA, Habana, Cuba. The invention relates to devices adapted to hold a quantity of material and to discharge the same from a vessel in predetermined quantities, and while it is adapted to be used with materials of different kinds, such as powdered soap and other material in granulated or powdered form, it is especially adapted to be used on the table for holding sugar and for delivering at each operation the desired amount for a cup of coffee or tea.

DISTRIBUTING DEVICE.—O. CAVIGLIA, Habana, Cuba. The object in this invention is to provide means adapted to contain commodities of various kinds, and to discharge them as desired in predetermined quantities. The device is adapted to be used with materials of various kinds, but is especially to contain sugar and to measure out the desired amount for a cup of coffee without handling the bulk of sugar contained in the receptacle.

AIR-SHIP.—G. BOLD, Plainfield, N. J. This invention is an improvement in airships, having among other objects to provide for the utilization of side currents of air when the ship is in flight, by employing the same to assist in driving the ship and also to provide for the easy control of the ship's movements by in effect giving flexibility to its hull and for the convenient storage and discharge of ballast.

Prime Movers and Their Accessories.

PISTON-VALVE. — P. KINANDER, Minneapolis, Minn. In the present patent the invention has reference to certain improvements in piston valves especially designed for use in controlling the flow of motive fluid to steam engines, hydraulic motors, and the like, although the valve may be used for other purposes.

HYDRAULIC MOTOR.—G. W. DAVIES, New York, N. Y. This hydraulic motor is designed in the present invention to be connected with a source of water under pressure, and to discharge the water under increased pressure, for the purpose of raising a column of water to a considerable length, or for other purposes.

Railways and Their Accessories.

GRUBBER.—D. TAYLOR, JR., St. Francisville, La. This grubber is particularly useful in connection with devices of this character intended for use in removing railroad ties and the like. It is adapted for use in connection with hard, rocky ground or shale. It may also be used for removing the tie from underneath the rails after the same has been freed from the earth or ballast surrounding it.

AUTOMATIC SWITCH.—W. A. SNAPP, Harris, Mo. The switch is especially adapted for street railway use, although not limited to such, as it may be used with advantage on railways of other kinds. One embodiment of the invention consists of a novel trigger mechanism placed intermediate the switching points and connected therewith, combined with operating bars extending between the side track and main track, acting, when pushed in one direction, to positively throw the switching points.

RAILWAY-TIE.—C. C. DANIELS, Grants Pass, Ore. In the present patent the invention has reference to improvements in metal ties for railways, the inventor's object being the provision of a metal tie of novel construction and so arranged that rails may be readily placed and held in position without using spikes.

Pertaining to Vehicles.

BICYCLE.—E. T. PETERS, Lincoln, Neb. The invention relates to that class of propelling mechanisms for bicycles in which treadle levers are arranged to be given alternately an up and down movement by the rider. The patentee provides a novel arrangement of rack bars which coact with clutch devices for transmitting the motion from the treadles to the rear wheels and also in a novel manner provides for maintaining the rack bars in their proper positions.

OIL-SPREADER.—W. M. MURRAY, Sawtelle, Cal. The spreader is particularly useful in connection with devices for use in spreading oil, tar, asphaltum, and the like upon roads. The inventor's object is to provide an oil spreader which is simple, strong, and durable in construction and by means of which the fluid is forced into the roadway under the surface of the same.

Design.

DESIGN FOR A CHANDELIER-BODY.—E. GOTHBERG, Jersey City, N. J. This ornamental design for a chandelier body shows a flanged base resting on a square at the end of the upper half. The lower half rounds down to a point. All four joints that join the body are ornamented with extra metal strips.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

Notes and Queries.

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.
Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(10539) E. H. asks: Would you kindly advise me, through your notes and queries column, relative to the following, viz.: I desire to protect my country residence from the effects of lightning. My house is located on a point of land which is surrounded by water. House is built upon rocks with a covering of about six feet of earth, about 18 feet above normal high tide; the drain and soil pipes are 6 feet under ground and drain into the water, being constantly covered by water. The house is a wooden structure (four-story), with a concrete foundation, having doors and windows screened with copper wires. The roofs and drain pipes are made of copper. Have several dormer windows and two projecting chimneys. Height of house about 60 feet at its highest point. I propose to erect a 70-foot flagpole distant about 125 feet from the house, imbedded in a rocky cement foundation, which flagpole I propose to protect with a braided or many-strand copper conductor tipped by an iron rod having the usual gold-pointed lightning rod. The flagpole wire to be properly grounded or imbedded in moist earth. Some authorities claim that this would be the best possible protection against lightning. What I desire to know is, would you also protect the several prominent projecting or angular points of the house with a similar lightning rod and conductor, and should these latter be insulated from the house proper, or should they be grounded on the house structure as advised by some western lightning-rod experts? I fully understand the physics of a discharge of lightning. The only question arising is: Should the conductor be insulated from or grounded on the house structure proper? Do I need extra lightning-rod precautions, because of the fact of the protected flagpole? A. If we had your house we should place upon all gables, and high points of the roof, rods rising 3 to 4 feet above the roof, and over the chimney tops a curved copper wire across each way from corner to corner. All these should be connected to the copper of the roof, and so by way of the roof and drain pipes with the water. We should also carry the stranded conductor from the flagpole into the water, as you perhaps plan to do. Lightning rods do not need to be insulated from the building, but should be closely connected to it. Of what use can a small glass insulator be in keeping electricity from the building four inches, perhaps, away when it has already overcome the resistance of a half mile of air? The flagpole does not afford sufficient protection to the house. No one lightning rod can protect a house of any size.

(10540) C. B. T. asks: I have been trying to make a touch spark coil for a gasoline engine but it fails to give a spark much larger than the batteries alone. I took a thin brass pipe filled with iron wires for my core, 6 inches long by 1¼ inch diameter, then forced on two wooden ends and wound on four pounds No. 14 magnet wire in the usual manner. It makes just as large a spark on snapping the wires apart, with the core out as with it in. I know the batteries are all right because they give a fine spark with a factory-made coil. Could the trouble be with the brass tube? Could you suggest a cause of the trouble? Also have you any copies of "Home Mechanics for Amateurs," and at what price? A. The trouble with your coil probably lies in the brass tube. When the current passes and is interrupted in the primary currents are generated in the brass tube which act to destroy the action of the current upon the secondary. Such a tube is commonly used in a medical coil, to cut down the current and enable one to adjust it to suit the case under treatment. If the tube were split along one side the trouble would disappear. It is not usual to have a metal tube for winding the coils. Hard rubber, wood or paper is commonly used. We send "Home Mechanics" for $1.50.

(10541) H. P. A. asks: Will you please give directions for making a spark coil for gas lighting? Upon what principle does such a spark coil act? A. A spark coil for gas lighting may be made from the following data: Core, 8 inches long of No. 18 soft iron wire in straight pieces. Cover with brown paper and shellac. Put wooden ends firmly upon the core to act as ends of the spool for the winding. Wind 13 layers of No. 16 double cotton-covered copper magnet wire in even layers on the core. This coil with 3 to 5 dry cells will give a fat spark on breaking the circuit. Such a coil acts by self-induction. When the circuit is made, a current flows through the coil from the battery, and an induced current flows through the same coil, but in the opposite direction to the battery current. When the battery current is interrupted, an induced current is produced in the coil in the same direction as the battery current. These two currents in the same direction produce the strong spark which is seen when a current through a coil is interrupted.

NEW BOOKS, ETC.

Mendelism. By R. C. Punnett. Cambridge: Macmillan & Co., 1907. 32mo.; 84 pages. Price, 80 cents.

That Mr. Punnett's admirable little book on Mendelism should have passed to a second edition speaks well for the rapid advance which the new ideas of breeding, heredity, and the origin of species have made in recent years. This reprint differs from the original book in so far as it contains a new discussion of dihybridism and illustrations which explain this series of phenomena. Although so small a book can hardly discuss with thoroughness the great mass of facts which have been accumulated of late years by biologists, it gives a very clear, straightforward explanation of a law which was discovered long before Darwin advanced his epoch-making views, and the correctness of which is only now receiving recognition.

Steam Turbines. Practice and Theory. By Lester G. French. Brattleboro, Vt.: The Technical Press. 8vo.; cloth; 418 pages, ill. Price, $3.

It is during the last five years only that the steam turbine has been raised to a degree of efficiency that makes it of commercial value. For the nine years previous to July, 1906, Mr. French was editor-in-chief of Machinery, so that his knowledge of turbines covers all the questions that arose during the entire period of their active development. The book commences with a chapter on Steam Turbine Principles, showing in an easily understood way how the energy of steam in a jet is arrested and appropriated by turbines of the distinctive types. The second chapter illustrates some of the Early Steam Turbines, and is designed to acquaint would-be inventors with what has been already attempted and accomplished, and to warn them from alluring but misleading paths. Several chapters descriptive of the different types are followed by 89 pages devoted to Steam Turbine Performance, giving the results of various tests, comparisons with the performance of reciprocating engines and considerations of the effect of vacuum and superheating. Chapter IX is a compilation of various Experiments on the Flow of Steam, followed, after a consideration of Steam and its Properties, by a chapter of Calculations on the Flow of Steam. These chapters, with that on Turbine Vanes, are necessarily somewhat mathematical, but the difficulties have been smoothed away as much as possible. A short chapter treats of Bodies Rotating at a High Speed, explaining the problems involved in balancing, and Efficiency and Design, the Commercial Aspect of the Turbine, Care and Management, Condensing Apparatus, and the Status of the Marine Turbine receive consideration in separate chapters. The book closes with a statement of the status of marine turbines, and has an appendix containing curves showing the kinetic energy of a steam jet in foot-pounds, the velocity of a steam jet, and tables of the properties of saturated steam. The book as a whole is not above the comprehension of the average reader and will convey to its student an excellent grasp of the principles involved in turbine engineering and what has been done toward their application.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending May 21, 1907.

AND EACH BEARING THAT DATE

[See note at end of list about copies of these patents.]

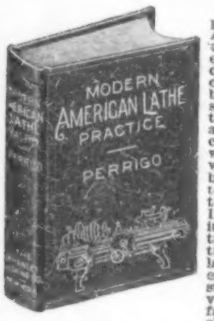
Accounting apparatus, J. S. Caldwell	854,402
Addressing and printing machine, envelop, M. P. Kenna	854,041
Air brake pistons and cylinder heads, device for holding, W. S. Scott	854,242
Air compressor, automatic tidal, W. O. Webber	854,009
Air compressor combined with an explosive motor, A. Michelin	854,371
Air, heating and humidifying, W. H. Carrier	854,270
Air ship, E. Baumann	854,555
Air ship, advertising or other, J. C. Burnell	854,461
Alcohols and their derivatives, production of aromatic, C. Mettler, reissue	12,654
Alloys, manufacture of, G. E. Buttenshaw	854,462
Armature, magneto, T. Hubert	854,421
Armature, magneto, C. F. Splitdorf	854,438
Assembling apparatus, N. Marshall	854,697
Assorting device, Howell & Duff	854,356
Automatic gage, P. M. Freer	854,481
Automobile, J. W. Richley	854,530
Automobile life guard or fender, B. F. Hart, Jr.	854,162
Automobile running gear, A. Groenig	854,210
Automobile steering gear socket, H. T. Cameron	854,566
Awl, sewing, L. G. & C. P. Carillon	854,147
Axle, E. G. Hartle	854,212
Axle, jointed spindle, M. Bideau	854,451
Bag fastener, H. Tueckmantel	854,128
Bag holder, O. Cronholm	854,077
Bait, artificial, E. A. Grout	853,972
Baking utensil, cake and pie, L. Nelson	854,592
Baling press, C. W. Field	854,345
Baling press, C. E. Bower	854,454
Baling press, J. S. Tuttle	854,678
Barn and shed, wooden, von May & Werkenthin	854,514
Barrel and receptacle, H. S. Reynolds	854,237
Basin and bath tub attachment, Steiner & Evans	854,184
Battery plate and making same, J. Bijur	854,326
Beam, structural I, H. F. Voshardt	854,391
Bearing, antifriction, T. Fox	854,573
Bearing, ball, H. B. Keiper	854,505
Bed and couch, combined, D. T. Owen	854,175
Bed, baby folding, N. P. Thompson	854,441
Bedstead, metallic, J. & H. J. Brookes	854,561
Belt stretcher, S. F. Eshelman	854,343
Beryllia from alumina and iron, separating, Bran & Van Oordt	854,560
Bicycles, etc., gearing for, M. Pedersen	854,599
Bill book, E. D. Conklin	854,197
Binder, loose leaf, J. C. Dawson	853,962
Binder, loose leaf, Dawson & Heeter	853,963
Binder, loose leaf, T. E. Heeter	853,975
Binder, loose leaf, D. S. Baird	854,622
Binder, temporary, C. J. Bryant	854,074
Bit. See Drill bit.	
Bleaching, sterilizing, or conditioning agent, producing a, S. Leetham	854,508
Boat, submarine, L. Y. Spear	854,004
Boat, submarine, J. M. Cage	854,146
Bobbin turning apparatus, R. M. Goodnow	854,693
Boiler hanger, T. C. Best	854,143
Boilers, hand hole plate for, R. C. Stevens	854,061
Book back, loose leaf, W. J. Schultz	854,181
Book holder, reference, N. H. Fulton	854,414
Boot and shoe, F. R. Duncan	854,571
Bottle closure, J. Slonka	854,243
Bottle or container, cellular, C. S. Jackson	854,357
Bottle stopper, A. M. Edwards, Jr.	854,201
Bottle washing and scrubbing mechanism, W. Seidel	854,535
Bottle washing machine, R. G. Nash	854,173
Bottle wire cutter, J. A. Goebler	853,969
Bottles and the like, machine for washing, R. G. Nash	854,172
Brake shoe key, D. H. Fairbanks	854,475
Bridge, portable, F. Charron	854,329
Bridle, F. A. Stimson	854,677
Briquets from coal, peat, and bog earth, manufacturing, J. Buss	854,565
Brooder, Meacher & Montgomery	854,587
Broom rack, O. C. Fletcher	854,084
Brush, fountain, H. Nothe	854,231
Buggies, foot rest for, J. B. McCarty	854,103
Buggy storm front, M. W. Beardsley	854,324
Buggy top, lever actuated, A. Groenig	854,211
Building block, F. W. Oelschlaeger	854,708
Building block mold, hollow, W. J. Faulkner	854,692
Building construction, clip for metal, W. Goss	854,209
Butter and fats, apparatus for melting and purifying, C. A. Janson	854,422
Butter, manufacture of process, R. Roos	854,383
Button, W. S. Osborn	854,233
Button, collar, A. Gaines	854,575
Cabinet, kitchen, I. O. Curtice	854,569
Calendar, J. E. Treat	854,127
Calendar, lunar, G. Casale	853,959
Can. See Oil or gasoline can.	
Can filling machine, C. H. Ayars	854,683
Can opener, H. Rutt	854,434
Cane cutting and conveying machine, sugar, H. G. Ginaca	854,208
Cane cutting machine, sugar, H. G. Ginaca	853,967
Canister, soap powder, H. C. Fairchild	854,411
Car, S. Otis	854,701
Car chute, C. L. Spurlin	854,249
Car, convertible, J. A. Brill	854,687
Car coupling, E. O. Warner	854,444
Car door, grain, T. Leonard	854,049
Car door hanger, R. G. Bullard	854,564
Car door mechanism, dump, D. H. Foreman	854,639
Car draft gear, railway, C. T. Westlake	854,132
Car frame, passenger and like, A. Christianson	854,404
Car, passenger and like, A. Christianson, 854,330, 854,331,	854,405
Car, railway, S. Otis	854,305
Car traffic system, motor, R. T. Yates	854,261
Car underframe, metallic, J. M. Hansen	854,349
Car underframe, passenger and like, A. Christianson	854,403
Cars, electric lighting system for railway, W. J. Bohan	854,072
Cars, metallic compartment construction for passenger and like, A. Christianson	854,406
Carbonating apparatus, liquid, Twitchell & O'Connor	854,390
Carbureter, J. W. Smith	854,246
Carbureter, H. M. Reichenbach	854,604
Carrier, G., W. G., & M. J. Beatty	854,556
Cart, log, J. A. Perry	854,601
Cartridge pocket, F. R. Batchelder	854,017
Casting and conveying machine, W. McVay	854,520
Cattle guard, Ellis & Finnell	854,083
Ceiling mold, J. B. Blaw, 853,955,	853,957
Cellulose ester, H. S. Mork	854,374
Cement, manufacture of hydraulic, B. Enright	854,342
Cement tiles, posts, pickers, etc., machine for making, C. D. Schroeder	854,060
Centering mold, J. B. Blaw, 853,952 to 853,954,	853,956
Chair, R. Matthews	854,298
Chair attachment, A. Thompson	854,544
Chair fan attachment, J. F. Dorris	854,634
Cheese cutter, computing, R. H. Neff	854,521
Chimney and ventilating shaft top and the like, A. Holtzheuer	854,291
Chimney cleaner, O. N. Miller	854,101
Churn, W. J. Rine	854,240
Cigarette making machine, L. B. Baron	854,140
Circuit closing device, F. W. Erickson	854,205
Clasp, E. K. Sumerwell	854,254
Clasp, C. H. Phillips	854,430
Clevis, G. H. Darrington	854,633
Clock movement, C. T. McClintock	854,518
Clothes drying device, A. M. Bullock	854,267
Closet bowl and sink connection, J. M. Hayden	854,695
Clothes line hanger, F. W. Steuer	854,611
Clothes line support, F. Clark	854,568
Cluster socket, G. A. Harter	854,493
Clutch, B. F. Reichenberger	854,529
Clutch, magnetic, A. Pick	854,107
Clutch, stay bolt, W. Jones	854,169
Clutching device, Bailey & Jackson	854,139
Coal cutting machine, F. Stiepel	854,612
Cock and faucet, A. Ullmann	854,007
Cock, combined gage and stop, H. J. Reynolds	854,108
Cock and water heaters, water, R. C. Simpson	854,538
Colander and cake pan, combined, C. W. G. Allender	854,394
Collar fastening device, lady's, J. D. Lee	854,583
Coloring and tanning apparatus, C. J. Glasel	854,415
Comb, J. G. Higgins	854,498
Combustion, conducting, B. E. Eldred	854,156
Combustion under pressure, apparatus for generating and storing products of, T. H. Cole	854,466
Commutator switch, E. B. Jacobson	854,039
Compass handle adjusting device, O. G. Mayer	854,586
Concrete block machine, W. W. Verner	854,130
Concrete mixer, C. L. Baldwin	853,945
Concrete wall form, O. F. Mann	854,098
Condenser, W. S. Johnson	854,650
Condenser, electric, I. Moscicki	854,662
Conduit, frost proof, H. H. Macomber	854,366
Controller operating means, A. J. Brown	854,688
Conveying apparatus, I. M. Henricks	853,976
Conveying loads between points of varying distance, apparatus for, W. Mollier	854,052
Copy holder attachment, T. E. Ford	854,478
Core drill, R. M. Downie	854,570
Corn cutting machine, J. Schauber	854,997
Corn shocking mechanism, J. E. Simmonds	854,059

RECENT BOOKS

MODERN AMERICAN LATHE PRACTICE

By OSCAR E. PERRIGO, M.E.

Price $2.50

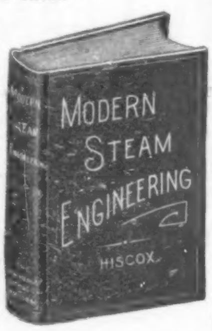


A complete book of 400 pages on The Modern American Lathe. Its development from the earliest times up to the present day; its modern form as constructed by up-to-date builders; its general and special classes of work; the quantity of its output, and its marvelous accuracy. Written by a man who knows not only how work ought to be done, but who also knows how to do it, and how to convey this knowledge to others. It is strictly up-to-date in its descriptions and illustrations which represent the very latest practice in lathe and boring mill operations as well as the construction of and latest developments in the manufacture of these important classes of machine tools. A large amount of space is devoted to the turret lathe, its modifications and importance as a manufacturing tool. Multiple spindle and automatic chucking lathes are fully considered, as are also special high power lathes for the use of high speed tool steel, and electrically driven lathes. In the treatment of the subject 315 illustrations and examples from the best practice have been made use of, as by illustration alone can many of the important details and methods be clearly presented.

Modern Steam Engineering in Theory and Practice

By GARDNER D. HISCOX, M.E.

Price $3.00



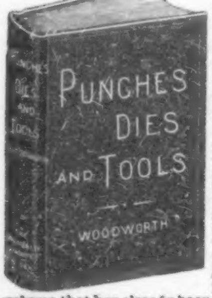
This is a complete and practical work of 487 pages, dealing with the care and management of Boilers, Engines, Pumps, Superheated Steam, Refrigerating Machinery, Dynamos, Motors, Elevators, Air Compressors, and all other branches with which the modern Engineer must be familiar. It fully describes and illustrates the properties and use of Steam for the generation of power in the various types of engines in use. Slide Valve, High-Speed Corliss, Compound, Multi-expansion engines and their valve gear, the De Laval, Parsons, Curtiss and other Turbines are included and fully described and illustrated. Forty two tables of the properties and application of steam in its various uses are included, which in themselves form a most valuable and instructive section of the work.

Nearly Two Hundred Questions with their Answers on Steam and Electrical Engineering likely to be asked by the Examining Board are included. These if studied by you will help you to procure a license. This book is thoroughly reliable and practical, and not only a guide but a teacher. As a text book it is the latest and best authority on the subject. It is fully illustrated with detail engravings, not to be found elsewhere.

Punches, Dies and Tools for Manufacturing in Presses

By JOSEPH V. WOODWORTH

Price $4.00

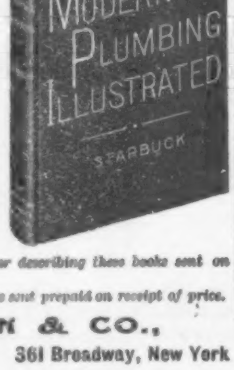


A practical work of 500 pages fully illustrated by nearly 700 engravings, being an encyclopedia of Die Making, Punch Making, Die Sinking, Sheet Metal Working, and Making of Special Tools, Sub-Presses, Devices and Mechanical Combinations for Punching, Cutting, Bending, Forming, Piercing, Drawing, Compressing and Assembling Sheet Metal Parts and also Articles of other Materials in Machine Tools. Two Hundred and Ten Processes are clearly described and fully illustrated. This work is a companion volume to the author's elementary work entitled "Dies, Their Construction and Use." Nothing appears in this volume that has already been published in the author's previous work on "Dies."

Modern Plumbing Illustrated

By R. M. STARBUCK

Price $4.00



A comprehensive and up-to-date work illustrating and describing the Drainage and Ventilation of dwellings, apartments, and public buildings, etc. The very latest and most approved methods in all branches of sanitary installation are given. Adopted by the United States Government in its sanitary work in Cuba, Porto Rico, and the Philippines, and by the principal boards of health of the United States and Canada. 300 pages. 55 full page illustrations.

☞ *A special circular describing these books sent on request.*

☞ *Any of these books sent prepaid on receipt of price.*

MUNN & CO.,

Publishers, 361 Broadway, New York

Handling dirt and saving gold, machine for, M. L. Proctor ... 854,702
Harness back band, B. W. Clendinen ... 854,628
Harness for producing free action of the limbs of horses, T. A. Shaver ... 854,536
Harvester, bean, J. H. McEntire ... 854,591
Harvester, corn, M. Cook ... 854,629
Hat fastener, lady's, J. B. Marshall ... 854,368
Hat frame former, E. A. Howe ... 854,216
Hats, guide for placing eyelets in, R. W. Fadden ... 854,637
Hay leveling device, C. Schutt ... 854,608
Hay loader, A. J. Hansen ... 854,090
Hay press, J. Christensen ... 854,465
Heat coil, F. B. Cook ... 854,272
Heater, C. H. Henzel ... 854,497
Heating system, circulating hot water in a, C. C. Peck ... 854,654
Hedge trimmer, J. T. Newberry ... 854,594
Heel seat forming machine, S. J. Wentworth ... 854,320
Hide and leather working machine, H. A. Holder ... 854,419
Hinge, W. S. John ... 854,580
Hog stop and cattle pass, combined, D. K. Wilson ... 854,322
Hoisting bracket, P. A. Nelson ... 854,302
Hoof pad, Handy & Hickey ... 854,034
Hoof trimming device, B. Huckleby ... 854,644
Hook. See Bill hook.
Horseshoe, G. T. Crandell ... 854,198
Hose and hose pipe controlling nozzle, T. Haley ... 854,641
Husking peg, Smith & Davis ... 854,247
Hydraulic drill, J. Charlton ... 854,464
Hydrogen, generating, Ellis & Eldred ... 854,157
Ice cutting machine, W. H. Craghead ... 854,631
Impermeable, incombustible, insulating, and acid proof material, U. A. Marga ... 854,367
Incubator regulator support, M. M. Johnson 854,648
Index machine, Schultz & Berkemeir ... 854,110
Ink well, L. D. St. Clair ... 854,542
Inker, C. R. Spicer ... 854,674
Insulated electric conductor, O. T. Hungerford ... 854,218
Insulator, H. D. Stauffer ... 854,315
Ironing board and washbench, combined, A. Schedin ... 853,998
Ironing machine, L. Rosenbaum ... 854,109
Jar holder, H. Borneman ... 854,686
Junction or outlet box, L. W. Bossert ... 854,195
Ladder, C. De Cook ... 854,152
Lace, T. Anderson ... 854,619
Lamp burner, W. B. Grover ... 854,576
Lamp, gas, H. E. Bruckner ... 854,027
Lamp, vacuum tube, D. M. Moore. 853,989, 854,104
Lamps, heating frame for, Z. L. Brooks ... 854,266
Larding needle, J. Snyder ... 854,387
Latch, H. G. Voight ... 854,085
Latch, C. J. Englert ... 854,473
Latch and holder, gate, J. Betts ... 884,193
Latch mechanism, H. G. Voight ... 854,008
Lathe carriage feed mechanism, W. Runge ... 854,532
Lathe for turning irregular shapes, M. H. Lyons ... 853,987
Laundry marker, G. L. Dixon ... 854,339
Leather clamp, C. B. Rathbun ... 854,603
Leather in different colors or shades, dyeing granulated, G. Feldmann ... 854,032
Leather skiving and splitting machines, feed mechanism for, A. Hirth ... 854,500
Leg supporter, artificial, E. H. Erickson ... 854,282
Lens grinder, bifocal, J. E. Gruessle ... 853,970
Letter box, N. T. Cheney ... 854,627
Life lines, means for throwing, C. H. Banks 854,624
Limit switch, G. Baehr ... 854,015
Lip turning machine, G. A. Hurley ... 854,168
Liquid dispensing apparatus, P. J. Flynn ... 854,412
Liquid dispensing apparatus, coin controlled, J. J. Mackeown ... 854,097
Liquid heating system, J. C. Bartlett ... 854,450
Liquids, separating, Kintner & Hanks ... 854,295
Lithopones, preparation of, R. Alberti ... 854,011
Loader, E. N. Smith ... 854,245
Locomotive buffer beam, C. T. Westlake ... 854,131
Locomotive safety device, T. H. Hale ... 854,290
Log hauler, A. O. Lombard ... 854,364
Loom warp stop motion, D. M. Hollins ... 854,167
Loom, weft replenishing, Smith & Langley ... 854,673
Lubricator, R. K. Barnes ... 853,946
Lubricator, W. R. Eichenser ... 854,636
Magnet box and armature of magnet contained therein, C. D. Lanning ... 854,363
Mail bag delivery apparatus, D. Smith ... 854,115
Mail box delivery apparatus, E. S. Baughman ... 854,192
Mail handling device for railway mail service, C. F. Robinson ... 854,705
Malting grain, K. I. Smith ... 854,003
Manifolding attachment, W. A. Rankin ... 854,703
Manifolding pad, S. W. Gass ... 854,483
Manila copal, etc., insoluble in oil, rendering, W. Baringer ... 854,071
Massage machine, pneumatic, A. A. Wickland ... 854,548
Match box, J. W. Hurd ... 854,579
Matrices, master block for making, F. H. Brown, et al ... 854,459
Matrices, master block for producing, F. H. Brown, et al ... 854,458
Matrices, producing, F. H. Brown, et al ... 854,456
Matrix making master block, F. H. Brown, et al ... 854,457
Measuring device, W. C. Fogle ... 854,476
Measuring, winding, and weighing machine, combined, C. W. Cottrell ... 854,467
Mechanical motor, Ruse & Oxley ... 854,607
Mechanical movement, F. H. Richards ... 854,056
Metal bending machine, C. E. Weeks ... 854,067
Metal, manufacture of cast, R. C. Totten ... 854,126
Metal sheets, tinning or coating, L. C. Steele ... 854,006
Metallic oxids, reducing, F. M. Becket ... 854,018
Metallic tie and rail fastener, Hogbin & Ketley ... 854,501
Metallic tie and rail fastener, Kamp & Grundy ... 854,504
Metallic tie and rail fastening, J. T. Hallam ... 854,492
Milk sampler, W. F. Bucher ... 854,563
Milk vat, G. H. Simon ... 854,537
Milking apparatus, ccw. Hartnett & Robison 854,643
Milking machine, L. Burrell ... 854,268
Mill. See Fulling mill.
Miner's checks, device for collecting, F. C. Greene ... 853,971
Mining drill, W. Hauxwell ... 854,350
Mixing machine, J. D. Campbell ... 854,029
Mold, Hill & Peckham ... 854,214
Mold, Thomas & Burk ... 854,613
Mold and centering device, J. B. Blaw ... 853,951
Molding machine, Dawes & Whitehead ... 854,690
Moldings, device for cutting, P. F. Limacher ... 854,297
Mower attachment, lawn, M. Ketterer ... 854,424
Music rack and leaf turner, combined, H. E. Van Vleck ... 854,129
Musical instruments, controlling device for automatic, G. H. Davis ... 854,689
Nail driver, H. W. Scheve ... 854,180
Name plate and register for doors, combined, J. H. Paige ... 854,598
Neckwear, J. W. Frost ... 854,284
Nest, C. C. Ibson ... 854,219
Neurotometer, F. Kennedy ... 854,093
Note sheets, marking for, P. K. Van Yorx ... 854,064
Nozzle holder, J. H. Ruff ... 854,178
Nut lock, G. C. Wooddell ... 854,260
Nut lock, Ott & Kost ... 854,380
Nut lock, W. H. Devoe ... 854,471
Nut, lock, E. H. Musser ... 854,590
Oil burner, H. E. Armitage ... 854,553
Oil from crude oil, obtaining lubricating, Ryan & Burke ... 854,057
Oil or gasoline can, T. W. Alexander ... 854,618
Ordnance sighting apparatus, Benet & Mercie ... 854,558
Ore treating apparatus, T. D. Pitts ... 854,526
Ores, preparing and reducing, E. Pollacsek ... 854,527
Outlet box, L. T. La Paugh ... 854,045, 854,046
Package and holder for garments or the like, shipping, M. M. Strauss ... 854,062
Packing, C. B. Shepard ... 854,672
Packing, conical ring rod, T. W. Mitchell ... 854,589
Packing former and replacer, piston, J. J. Hannon ... 853,973
Packing, hydraulic, C. F. Rigby ... 854,239
Packing or gasket, E. L. Perry ... 854,234
Packing, metallic, W. M. Brooke ... 854,400
Packing, rod, O. J. Garlock ... 854,287
Pallet for ships' bottoms, G. G. Schobert ... 854,241
Painter's utensil, C. Fischer ... 854,638
Panel boards and the like, construction for, H. Krantz ... 854,654

How to Construct An Independent Interrupter

In SCIENTIFIC AMERICAN SUPPLEMENT, 1615, A. Frederick Collins describes fully and clearly with the help of good drawings how an independent multiple interrupter may be constructed for a large induction coil.

This article should be read in connection with Mr. Collins' article in SCIENTIFIC AMERICAN SUPPLEMENT, 1605, "How to Construct a 100-Mile Wireless Telegraph Outfit."

Each Supplement costs 10 cents; 20 cents for the two. Order from your newsdealer or from

MUNN & CO., 361 Broadway, New York

Important to Subscribers for Scientific American in Canada

Owing to recent changes in the Postal Laws, copies of SCIENTIFIC AMERICAN mailed to addresses in Canada will have to be prepaid by stamps affixed at the rate of one cent for each four ounces or fraction thereof.

Commencing May 1, 1907, the rates for subscriptions for our periodicals mailed to Canada, *postage prepaid*, will be as follows:

	PER YEAR
Scientific American	**$3.75**
Supplement	**5.50**
American Homes and Gardens	**3.50**
Scientific American and Supplement (to one address)	**8.25**
Scientific American and American Homes and Gardens (to one address)	**6.25**

MUNN & COMPANY, Publishers
SCIENTIFIC AMERICAN OFFICE
361 BROADWAY, - NEW YORK

Paper measuring and cutting machine, H. W. Sanderson 854,179
Paper treating composition, J. Czerny 854,470
Patterns and the like on tissues, production of transparent, A. Giehler 853,966
Peeling apparatus, vegetable, W. L. Weber. 854,258
Pen and pencil holder, F. L. Benstead 854,019
Pen clip or sustaining device, fountain, A. Martinelli 854,584
Pen, drawing, O. G. Mayer 854,585
Pen extractor, H. A. Steiner 854,610
Pen, fountain, H. B. Levy 854,226
Pen, fountain, W. C. Luther 854,227
Pen or pencil clip, V. L. Ochoa 854,378
Pencil, J. D. R. Lamson 853,983
Pencil holder and point protector, R. Klipfel 854,507
Pencil holding device, H. L. Patzold 854,053
Pencils, eraser holder for lead, B. B. Goldsmith 854,487
Pencils, eraser tip for lead, B. B. Goldsmith 854,488
Perambulator, A. Kazmeier 853,980
Permutation lock, J. J. Murphy 854,427
Pessary, L. Nelson 854,593
Phonograph record holder, T. V. Skelly 854,002
Phonograph system, W. & J. Patten 854,525
Photographic developing machine, F. A. Brownell 854,026
Photographic printing machine, J. C. Calhoun 854,076
Photographic shutter, M. Klaiber 854,221
Piano action, J. H. Deutsch 854,280
Piano pedal, automatic, J. D. Pease 854,307
Pianos, repeating action for upright, C. Sauter 854,058
Picker. See Fruit picker.
Picture exhibiting apparatus, moving, Dyer & Holden 854,199
Pie trimming and crimping machine, automatic, C. Oskamp 854,304
Pipe coupling, train, C. W. Taylor 854,124
Planing machine feed roll, wood, C. E. Harper 854,64
Planting mechanism, N. B. Hodge 854,165
Pliers, jewelers' cutting, H. B. Rowan 854,433
Plow, J. S. Click 853,961
Plow, traction gang, C. J. Johnson 854,423
Poke, animal, J. F. Carter 854,567
Polishing composition, T. A. D. Ackley 854,448
Pool and billiard table cushion rail, G. A. Lang 854,225
Portable chair, Domsgen & Kujawa 854,154
Poultry fountain, Johns & Lansing 854,647
Power transmitting device, D. S. Seymour. 854,671
Press or sad iron, J. B. Replogle 854,431
Presses, gage pin for platen, Osterholm & Eastman 854,106
Pressure regulator, R. M. Dixon 854,340
Printing plate, E. Spitzer 854,675, 854,676
Propeller, W. Schmid 853,999
Propeller, J. Bermes 854,685
Propeller for vessels, H. R. Shaw 854,112
Propeller, motor, pump, or blowing engine, machine with revolving wings or blades, applicable either as, H. Huckel 854,038
Pump, F. G. Hobart 854,353
Pump, oil well, F. H. Taylor 854,255
Pump operating means, E. O. Smith 854,314
Pump piston, C. M. Ray 854,382
Punch, pocket check, Cox & Ontrich 854,630
Punching bag platform, L. Bergmann 854,264
Punching press, sheet metal, J. A. Eden, Jr. 854,706
Puzzle, W. H. Failor 854,031
Puzzle, W. Werner 854,547
Radiator, F. Darlington 854,278
Rail anticreeper, N. E. Salsich 854,435
Rail brace, R. C. Stevens 854,252
Rail bond protector, L. B. Buchanan 854,328
Rail bonds, manufacture of, G. A. Mead 854,099
Rail cleaner, H. Quertier 854,668
Railway rail stay, H. H. Sponenburg 854,060
Railway safety appliance, E. L. Bell 854,398
Railway safety applance, G. W. Jayne 854,503
Railway switch, automatic, E. C. Northrup 854,700
Railway tie, W. Jacobson 853,978
Railway tie, Dunkle & Whetstone 854,155
Ratchet wrench, J. N. Noyer 854,174
Razor, safety, R. J. Christy 853,960
Razor, safety, W. H. G. King 854,506
Razor strop fastener, W. Whiteley 854,068
Razor stropping machine, E. F. Bowden-Smith 853,958
Regulator, R. D. Wirt 854,393
Resilient wheel, T. Gare 854,286
Rotary engine, L. K. Silvertson 854,001
Rotary engine, T. S. Barwis 854,141
Rotary engine, A. Ghira 854,346
Rotary engine, J. E. Friend 854,574
uler, desk, H. F. Belcher 854,325
Saddle, J. H. Gillespie 854,086
Salting machine, can, F. W. Burpee 854,075
Salts of volatile bases, producing, T. Blass, et al 854,453
Sandpapering and polishing machine, M. L. Beal 854,625
Sash lock, W. Stephens 854,250
Sash, metallic window, C. & O. A. Neidig. 854,665
Sausage linking machine, H. R. Kuersten 854,044
Saw clamp, C. H. Spray 854,540
Saw, crosscut, L. Mutsch 854,102
Saw filing apparatus, F. J. Miller 853,988
Saw handle, W. B. McCain 854,517
Sawing machines, self feed for mortise and tenon, J. E. Erickson 854,410
Scaffold attachment, swinging, W. B. Stoops 854,253
Scaffold bracket, folding, F. F. Haskell 854,163
Scale, F. A. Selley 854,609
Scale and chord circle, A. R. Fitch 854,572
Scale, weighing, T. Gagnon 854,285
Scribe gage, G. Cousino 854,333
Scythe blade attachment, C. A. Mehaffey 854,051
Seed hull delinting machine, cotton, W. Oliver 854,232
Separator. See Cream separator.
Sewing and embroidering machine, T. O'Neill 854,105
Sewing machine, blindstitching, F. W. Merrick 854,660
Sewing machine, slack thread controller, W. H. Stedman 854,119
Shade fixture, window, R. D. Mayberry 854,515
Shade hanger, window, Bachman & Green 854,014
Shaft coupling, R. L. Lowry 854,426
Sharpening device, hoe, T. B. Criddle 854,632
Sheet feeding machine, F. L. Cross 854,079
Sheet feeding machine, H. Hallstream 854,088
Sheet material feeding mechanism, W. G. Johnston 854,040
Sheet separating mechanism, J. P. Knapp. 854,222
Sheets, controlling mechanism for machines acting on, F. L. Cross 854,078, 854,080
Ships, circular conveyer for, J. C. Barr 854,684
Shirt waist holder and skirt supporter, M. E. McConnell 854,301
Shoe attachment, Crook & Schwartz 854,274
Shoe polisher, M. Christenson 854,407
Shuttle, J. Robinson 854,531
Silo, G. P. Youmans 854,010
Sign, mechanically operated, J. A. Wiedemann 854,190
Signals, clock mechanism for, F. O. Warner 854,066
Signaling device, torpedo, E. E. Blain 854,194
Skate, motor, C. I. Matson 854,299
Skirt bottom turning device, M. A. Kelly 854,294
Skirt or attachment therefor, W. Padernacht 853,993
Skylight structure, W. F. Plass 854,235
Smoke consumer, P. Vidal 854,679
Snap hook, J. E. Johnson 854,293
Spark arrester, Ballewski & Wessel 854,016
Spray for painting, agricultural, disinfecting, and other analogous purposes, automatic, W. Tyree 854,317
Sprayer, F. G. Hobart 854,352
Spring device, C. Hainlin 854,087
Spring wheel, J. E. Rielly 854,238
Square, carpenter's, H. W. Thompson 854,125
Square, combination, A. W. Hight 854,351
Square, folding, J. H. Matthews 854,659
Stairway, C. E. Paulson 854,667
Steam boiler, A. Oronhyatekha 853,992
Steam generator, W. S. Johnson 854,649
Steam generator fuel regulation system, H. Lemp 854,048
Sterilizer, electric, J. B. Wantz 854,318
Still, continuous boiling out, Ludlow & Mosher 853,986
Stove, W. S. Jackson 854,358
Stove, J. Rosenthal 854,605
Stove attachment, gas, E. Effert 854,202

OF CURRENT INTEREST

Industrial Alcohol

Its Manufacture and Uses

A PRACTICAL TREATISE

BASED ON

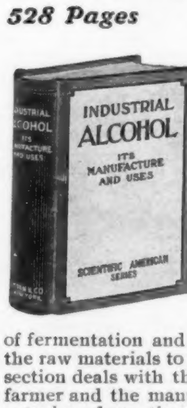
DR. MAX MAERCKER'S "INTRODUCTION TO DISTILLATION" AS REVISED BY DRS. DELBRÜCK AND LANGE

COMPRISING

Raw Materials, Malting, Mashing and Yeast Preparation, Fermentation, Distillation, Rectification and Purification of Alcohol, Alcoholometry, The Value and Significance of a Tax-Free Alcohol, Methods of Denaturing, Its Utilization for Light, Heat and Power Production, A Statistical Review, and The United States Law

By JOHN K. BRACHVOGEL, M. E.

528 Pages ***105 Engravings*** ***Price, $4.00***



THE value and significance of a tax-free alcohol have been so widely discussed in the press and periodical literature of the entire country, that it is unnecessary to emphasize the great importance of the subject, especially to our agricultural and industrial interests. For years we have been far behind the nations of Europe in this regard, and in consequence our literature has been sadly lacking in authoritative works covering this phase of industrial activity. This book was designed with the especial purpose of filling this want, and it is the latest and most comprehensive work of its kind which has been published in this country.

It is based upon the researches and writings of the most eminent of Germany's specialists in the sciences of fermentation and distillation. It covers the manufacture of alcohol from the raw materials to the final rectified and purified product. An introductory section deals with the importance of the new law and what it means to the farmer and the manufacturer. Additional sections cover the methods of denaturing, domestic utilization of alcohol for heating and lighting purposes, alcohol as a fuel for power production, and a statistical review. The full United States law is given in an Appendix.

The 105 illustrations are of especial value and excellently supplement the text.

Few in number are those to whom this book would not prove of interest and value. The farmer, the manufacturer, the power-producer, the householder, will all find that denatured alcohol is of such importance to them, that its use and introduction will effect savings and economies which were hitherto impossible of accomplishment.

Send for Descriptive Circular.

MUNN & COMPANY, Publishers, 361 Broadway, New York

Classified Advertisements

Advertising in this column is 50 cents a line. No less than four nor more than ten lines accepted. Count seven words to the line. All orders must be accompanied by a remittance. Further information sent on request.

BUSINESS OPPORTUNITIES.

BOND-SALESMEN WANTED.—A prominent New York City Realty Corporation desires high-class representatives to handle, on commission, High Grade 7 Per Cent. Gold Coupon Bonds, secured by selected New York City real estate. Bonds contain income participation clause giving holders 5 per cent. preferred division in earnings making total possible yearly income 12 per cent. Security and income features make these bonds a most desirable investment and insure ready sale. Underwriters Realty and Title Co., 1 Madison Avenue, Dept. 6, New York.

RODMAN & CO., 33D ST. AND 5th AVE. CAMBRIDGE BUILDING, N. Y., will finance meritorious propositions where large capital is required in the U. S. or Canada. Money loaned on securities. Mining, electric and steam railroads. Manufacturing plants.

MANUFACTURING OPPORTUNITY.—Will rent any part of 100,000 square feet floor space in well constructed heavy factory buildings. Best railroad and other shipping facilities. Would invest some capital if needed in manufacturing and marketing some specialty of merit. Labor conditions good. Address O. E. Koehler, Station D, Milwaukee, Wis.

PATENTS can be sold outright or royalty agreements made to much greater advantage if protected by us. Protection includes the right to use on all printed matter our Emblem reading "Patents Protected by Patent Title and Guarantee Company, 25 Pine St., New York."

INCORPORATE YOUR BUSINESS. Over sixteen hundred charters procured for my clients. Write for corporation laws, blanks free, to former Ass't Sec'y of State, Philip N. Lawrence, Dept. 16, Huron, So. Dakota.

"ASK OUR REPRESENTATIVES"—any one of the many—about the assistance and the co-operation that our system extends to them and why they are so successful in placing securities with the investing public. We desire a representative in every community. Request information at Old South Building, Seventh Floor, Boston, Mass., The Hammitt Investment Corporation.

FOR A FINANCIER.—I WANT A MAN WITH $5,000 to finance a newly patented absolutely burglar proof lock, the only one in existence; it is indorsed by the principal burglary insurance company of New York, and will be adopted by them when put on the market; positively a fortune in it. For further information and full particulars, address E. A. Whitney, 200 East 116th St., N. Y. 'Phone, 5317—Harlem.

PATENTS SOLD ON COMMISSION.—If you wish to buy or sell a patent write for particulars to E. L. Perkins, 72 Broad Street, Boston. Patent Sales Exclusively.

I SELL PATENTS.—To buy or having one to sell, write Chas. A. Scott, Granite Building, Rochester, N. Y.

FOR SALE.

CONDENSER FOR SALE.—One Worthington Surface Condenser. 2,500 square feet capacity, 1,000 h. p. Drawn brass tubes and Knowles air vacuum pump. Practically new, used about four months, first-class condition. Discontinued account installing equipment three times larger for our entire power plant. Address Jacob Dold Packing Co., Buffalo, N.Y.

HELP WANTED.

EDITOR.—Mechanical Engineer, not over 30, with practical factory experience for trade paper reaching factory owners, superintendents and managers. $1,800 to start. Hapgoods, 305 Broadway, New York.

AGENTS.—Here is a high-grade proposition for live representatives in various territories: A dustproof typewriter cover that is air-tight, durable, neat and easy to carry. Folds itself automatically by touching a button, is never laid aside and fits any make. "Showing" means "selling," as it will pay for itself within two months. No "pay for sample" scheme; we furnish samples. Write for circular. Address Dustproof Typewriter Cover Company, 154-156 Maiden Lane, New York.

MEN AND BOYS TO LEARN PLUMBING, Bricklaying, Plastering and Electrical Trades. Positions secured. Free catalogue. Coyne Trade Schools, New York, San Francisco and Chicago. Mention SCI. AMER.

"CAT BRAND" REVOLVING CUSHION HEELS turn as you walk and wear even. Cheaper than leather. Price 35 cents a pair postpaid. Send diagram of heel and address Cat Brand Heel Co., New Brunswick, N. J. Agents wanted.

AGENTS—Our Wonderful Cork-puller, not a screw, everybody needs, because no hard pulling is necessary; fits all bottles; send for circulars; plated samples, 25c. C. S. Hawley, 154 Leonard Street, New York.

MEN AND BOYS, LEARN PRACTICAL ELECTRICITY, the best-paid trade. Our 7-story building has total electrical equipment of $50,000. Day and evening courses; individual instruction. Positions guaranteed. Call or address N. Y. Electrical Trade Schools, 39 West 17th St., mentioning SCIENTIFIC AMERICAN.

AGENTS WANTED.

THOUSANDS IN USE throughout the world. $15.00 "Gem" Adding Machine, very compact, elegant side line. Special offer to high-grade agents. Automatic Adding Machine Co., Dept. 4, 332 Broadway, New York.

PHOTOGRAPHY.

PHOTOGRAPHERS, we want to get you in the habit of reading the American Photographer and Camera and Dark Room, the biggest and best Photographic monthly. The yearly subscription price is $1.50, 15 cents monthly at news dealers. We will send you four numbers as a trial subscription for 25 cents in stamps or coin. American Photographic Pub. Co., 361 Broadway, New York.

FILMS. FILMS. FILMS.—Lumiere Celebrated Films, made in Lyons, France, can now be purchased from all anti-trust dealers or from 11 West 27th Street, New York City.

PATENTS FOR SALE.

PATENT SAFETY BOTTLE AND CAPPING.—Inexpensive, efficient bottle to prevent counterfeiting of medicines, liquors, etc. Neither screw nor special tool needed to pull off the cork. Attractive appearance and safety to dealers. Security and ease to purchasers. Will gladly hear from direct concerns or financial party interested. Address Coste, 78 Broad St., R-405, New York.

WASHING MACHINE.—Advertiser will sell outright patent on a machine for practically and economically washing clothes. Those interested in an invention of this kind address Samuel H. Alspaugh, Burkeville, Va.

FOR SALE.—Patent No. 853,145, issued May 7, 1907, for a sewing machine hemmer which can be regulated to any size without changing the attachment. Big saving in operators' time and manufacturers' material. T. S. Zachaira, 497 Broadway, Long Island City.

FOR SALE.—Canada and United States Rights for Patent Automatic Window Ventilator, which excludes dust and smoke from your rooms. Address Gilman Moulton, 56 Cornhill, Boston, Mass.

MOTION PICTURES.

MOTION PICTURE MACHINES, Film Views, Magic Lanterns, Slides and similar Wonders For Sale. Catalog Free. We also Buy Magic Picture Machines, Films, Slides, etc. T. S. Harbach, 809 Filbert Street, Phila., Pa.

MOTION PICTURE MACHINES, Films, Slides and Supplies from the largest store of its kind in this city. Sole agent Power's Cameragraph the real fireproof machine. Catalogs. Lewis M. Swaab, 336 Spruce St., Phila.

THE MOVING PICTURE WORLD, weekly, 10 cents per copy; yearly subscription, $2. The only paper devoted to the moving picture, illustrated song and lantern lecture field. Moving Picture World, Box 450, N.Y.

TYPEWRITERS.

TYPEWRITERS—Caligraphs, $5; Visible Writers, $8; Hammond, $10; Remington, $12; Remington, two-color ribbon attachment, $18; all guaranteed. Send for catalog. Typewriter Co. (Dept. X), 217 W. 125th St., N.Y. City

CLEARANCE SALE—Remingtons, Densmores, Jewetts, Blickensderfers, Williams, $12.50; Postals, Hammonds, $10; Underwoods, Olivers, $35. Orders filled or money back. Standard Typewriter Exch., Suite 45, 231 Broadway, N. Y.

EXPERIMENTAL ELECTRICS.

STUDY ELECTRICITY AT HOME. Complete course, 30-pg. detail-book, 220-pg. text-book, 200 experiments, over 100 pieces of apparatus. Only $5.60. Bulletin "A S" explains. Thomas M. St. John, 848 Ninth Ave., N. Y.

EYE-GLASS SPECIALTIES.

REMARKABLE MAGNETIC SPECTACLE AND EYE GLASS OFFER. Send stamp, no postals, for Free Pair, coupon and testimonials. S. A. Fredrick Optical Co., Toledo, Ohio.

MACHINERY.

MOTORS AND GENERATORS.—Also refrigerating machinery and ice plants (no ammonia used). Send for estimates or booklet of information. Bidwell Electric Co., 133 S. Clinton St., Chicago, Ill., U. S. A.

SEASICKNESS.

SEASICKNESS and Car Nausea prevented, Brush's Remedy (Elixir prophylactic). Guaranteed perfectly Harmless. The only preparation that has never failed. Free booklet proving these statements sent by Brush Chemical Co., 299 Broadway, N. Y. All druggists $1 per bottle.

SOUVENIR POST CARDS.

25 BEAUTIFUL POST CARDS mailed to any address for 12c. A great variety of subjects. Sold by some stores at 2 for 5c. and others at 5c. each. Defiance Studio, 65 West Broadway, New York. Price list free.

AUTOS.

KIBLINGER AUTOMOBILE, $250. Built on honor, sold under guarantee. Speeds to 25 miles an hour, 25 to 50 miles on one gallon gasoline. Wood wheels, cushion tires, double chain drive. Satisfaction guaranteed. Write Dept. S, W. H. Kiblinger Co., Auburn, Ind.

AUTO ACCESSORIES.

EQUIP YOUR CAR WITH "HERCULES" Non-Skid, Puncture-Proof Tires; made by largest tire dealers in world; agents wanted everywhere. Republic Rubber Tire and Shoe Company, 1686 Broadway, New York.

SUPPLEMENTARY SPIRAL SPRINGS SAVE your nerves, tires, engine and patience. Know the luxury of travel. Write for Catalog "S." Supplementary Spiral Spring Co., 1780 Broadway, N. Y. (near 59th St. Subway.)

MISCELLANEOUS.

OUR VACUUM CAP when used a few minutes each day draws the blood to the scalp, causing free and normal circulation, which stimulates the hair to a new, healthy growth. Sent on trial under guarantee. Write for free particulars. The Modern Vacuum Cap Co., 617 Barclay Block, Denver, Col.

Strap fastener, Y. D. Hance	854,577
Street flushing apparatus, C. E. Wiberg	854,680
Street indicator, J. H. Goodier	854,416
Suit hanger, A. Holmer	854,420
Sweeping compounds, manufacture of, B. Singer	854,114
Swing, A. Spice	854,183
Swingletrees or doubletrees, adjusting wheel for, Darst & Harrelson	854,150
Switch lock, electric, F. W. Brandow	854,455
Syringe, W. G. Bridge	854,399
Syringe, vaginal, Searles & Jones	854,534
Tachometer, H. Shoemaker	854,437
Tag machine, G. W. Swift, Jr.	854,388
Teeth, display carrier for artificial, J. F. Gibson	854,486
Telegraph transmitter, J. Burry	854,401
Telephone exchange apparatus, C. D. Enochs	854,203, 854,204
Telephone exchange system, W. W. Dean	854,279
Telephone installations, automatic switch for, P. Hildebrand	854,164
Telephone set, portable combination, A. Stromberg	854,439
Telephone switch, J. S. Alsobrook	854,552
Telephone system, party line, G. E. Terhune, et al.	854,543
Telephone system, trunk line, W. W. Dean	854,337
Telephone transmitter, R. C. Browne	854,025
Telephone transmitters, sanitary attachment for, J. W. Dolson	854,472
Tellurian, C. B. Martin	854,513
Temperature regulator, F. Darlington	854,276
Tennis, etc., racket for, H. S. Brown	854,024
Theatrical apparatus, H. L. Bowdoin	854,265
Thread cutter, A. Karrer	853,979
Ticket issuing and recording machine, Ohmer & Bridenbaugh	854,606
Tiles, glass, etc., means or apparatus for burning or fixing the colors upon printed or decorated, L. W. Stanley	854,005
Time recorder, J. Ericson	854,281
Tire case, F. B. Hopewell	854,215
Tire fastener, C. L. Williams	854,549
Tire, laminated, J. W. Carhart	854,463
Tire or other valve, Schweinert & Kraft	854,182
Tire protector, S. C. Wolfe	854,137
Tire protector, H. L. Voss	854,186
Tire protector, J. E. Heale	854,213
Tobacco, bag for pulverizing slice plug cut, G. S. Ross	854,384
Tobacco booker, R. E. Anger	854,191
Tool holder, C. W. Meadowcroft, Sr.	854,100
Tool holder, M. D. Reidy	854,669
Tool, machine, A. Wood	854,446
Tool, portable pneumatic, Haeseler & Taylor	854,694
Tools, danger signal for portable electric, J. I. Ayer	854,013
Tooth crown model, C. F. Lauderdale	853,984
Toothpick machine, Stanley & Tainter	854,116
Toy, A. Ueberle	854,545
Toy, D. P. James	854,646
Toy, figure, W. H. Chandlee	854,271
Toy novelty, L. Lamprey	854,224
Track cleaner, D. R. Edwards	854,409
Track shifting machine, W. G. Bierd	853,948
Transformer coil support, C. E. Skinner	854,311
Transformer cooling means, F. Darlington	854,277
Transformer cooling means, Skinner & Kintner	854,312
Transmitting mechanism, J. A. Papot	854,176
Trimmer. See Hedge trimmer.	
Trolley amusement, H. G. Traver	854,185
Trolley pole support, J. Gribben	854,489
Trolley wheels, casting, F. B. Torrey	854,389
Truck and supporting stand, combined, C. Rawlinson	854,381
Truck bolster, car, G. A. Johnson	854,360
Truck, electric motor, B. R. Van Kirk	854,442
Truck mechanism, W. Fetzer, reissue	12,653
Trucks, brake mechanism for pivoted car, W. L. Austin	854,449
Trunk, G. W. Peterson	854,602
Tube expander, Stavenik & Mautz	854,118
Tube forming machine, E. Wiet	854,136
Turbine attachment, W. C. Aylor	854,620
Turbine, reversing steam, W. C. Gardiner	854,482
Turbine, steam, I. Abbott	854,447
Turbine, steam, E. Harvey	854,494
Turbines and fluid pumps, runner for, N. W. Akimoff	854,012
Type matrix, F. H. Brown, et al.	854,460
Type setting and distributing machine, L. Lebrun	854,095
Typewriter, C. S. Watson	854,187
Typewriter, C. Gibbs	854,484
Typewriter line lock mechanism, W. R. Fox	853,965
Typewriter ribbon mechanism, W. R. Fox	854,207
Typewriting machine platen or roller, T. F. Nolan	854,429
Umbrella, M. G. McGuire	854,663
Umbrella handle, interchangeable, J. F. Witt	854,259
Valve, R. Whitaker	854,133, 854,134
Valve, J. Weber	854,319
Valve casings, construction of, H. Cruse	854,334, 854,469
Valve, engine, B. Hanson	854,036
Valve for draining pipes, etc., W. V. Gordon	854,348
Valve, gate, L. Noel	854,523
Valve, shut-off, G. J. Leber	854,047
Valve, slow closing, Backus & Crane	854,138
Valve structure, L. H. Martell	854,698
Vegetable cutter, O. H. Miller	854,229
Vegetable cutter, R. A. Baggett	854,621
Vehicle, R. J. Weber	854,188
Vehicle brake, O. Schulz	854,386
Vehicle, motor, P. D. Bruen	854,408
Vehicle, motor, G. Rothgiesser	854,432
Vehicle speed gear, motor, T. H. Bastin	853,947
Vehicle steering gear, J. T. Girard	853,968
Vehicle wheel, E. F. Krell	854,655
Vehicle wheel, J. Nash	854,699
Vehicles, etc., gearing for motor, M. Pedersen	854,600
Vehicles, sighting apparatus for moving, W. H. Robertson	854,310
Vending machine, C. C. Inman	853,977
Veneers, machine for cutting barrel, F. Thornton	854,256
Ventilating apparatus, C. Kuderer	854,582
Ventilator. See Window ventilator.	
Ventilator, A. H. Newey	854,595
Vise, M. J. Hilberg	854,091
Vises, pipe and rod gripping attachment for, P. Broadbooks	854,145
Voltage regulator, S. B. Storer	854,123
Voting machine, C. L. Lorraine	854,657
Wagon, dump, C. A. Geiger	854,085
Wagon jack, G. & A. Haag	854,490
Wagon loader, C. A. Jose	854,651
Wagon reel, E. B. Curtis	854,081
Washing machine, I. L. Owens	854,597
Watch protector, S. Golombek	854,347
Water, apparatus for the treatment of refractory, R. T. Weaver	854,445
Water closet bowl, G. W. Knapp	854,653
Water closet ventilating device, A. T. Lueckenbach	854,365
Water colors, composition of, R. W. Cornelison	854,332
Water distributing apparatus, H. M. Sanders	854,385
Water elevator and carrier, W. C. Day	854,336
Water purifying apparatus, feeding device for, M. F. Newman	854,522
Watering device, Vorheis & Moyer	854,615
Wave power motor, T. Danford	854,082
Weather strip, H. W. Kraft	853,982
Web press, rotary, H. F. Bechman	854,142
Well drilling machine, J. Rourke	854,606
Wheel, Thomson & Kremer	854,063
Wheelbarrow body, C. H. Heineman	854,496
Wheelbarrow trays, machine for trimming and wiring, M. A. Duquett	854,691
Whiffletree, S. A. Hazelton	854,495
Whiffletree attachment, J. J. Owens	854,306
Wind instruments, pneumatic action for, J. Binnig	853,949
Wind motor, C. J. McMaster	854,664
Wind wheel, W. J. Kinney	854,652
Winding drum, expansible, A. C. Mills	854,661
Window cleaner, J. Deasy	854,151
Window, detachable bay, L. G. Quackenboss	854,055
Window ventilator, Glazier & Parker	854,033
Wire knotting machine, E. A. Hoefer	854,354
Wire reel, C. W. Stark	854,117
Wire stretcher, J. R. Hamilton	854,089
Wire winding machine, G. W. Stancliff	854,541
Wood, apparatus, for making imitation, W. N. Cornell	854,149
Woodworking machines, saw or cutter guard for, Holtz & Dick	854,355
Wool scouring machine, W. O. Milne	854,372
Wool washing and cleansing apparatus, electric, G. D. Burton	854,028
Woven fabric, J. E. Kerr	854,220
Wrapper cutting and registering apparatus, J. H. Brady	854,022
Wrapping machine, J. H. Brady	854,021, 854,023
Wrecking device, F. Oliver	854,596
Wrench, N. Smith	854,248
Wrench, N. W. Gudmundson	854,289
Wrench, G. H. Deeves	854,338
Wrench, F. McArthur	854,376
Yoke and yoke screw, C. T. Mapes	854,512

DESIGNS.

Horn, L. T. Terhune	38,477
Reflector, A. J. Morgan	38,578
Ribbon, E. M. Corbett	38,581
Tiling, A. A. Spadone	38,580
Tube, collapsible, W. H. Blood, Jr.	38,579
Watch pendant, L. E. F. Wachter	38,476

TRADE MARKS.

Alloy resembling silver, Queen Metal Co.	62,653, 62,654
Bandages, supporters, and suspensories, elastic, A. G. Spalding & Bros.	62,630 to 62,632
Beer, root, Charles E. Hires Co.	62,687
Boilers, water tube, McNeil Boiler Co.	62,697
Boot, shoe, and leather polish, Pittsburg Waterproof Shoe Polish Co.	62,731
Boots and shoes, leather, Drake & Co.	62,636
Boots and shoes, leather, Smith-Briscoe Shoe Co.	62,644
Boots and shoes, leather, B. Rosenberg & Sons	62,655
Bread, wheat, H. Richter	62,665
Bottle openers, metal, A. W. Stephens Manufacturing Co.	62,765
Buckles, Marvel Buckle Co.	62,756
Buggies and wagons, Columbus Buggy Co.	62,634
Calipers and gages, Morse Twist Drill and Machine Co.	62,758
Candy, E. C. Sperry	62,703
Canned fruits and vegetables, T. Kensett & Co.	62,661
Cement and concrete, building, C. W. Hull Co.	62,709
Cement, Portland, natural rock, and improved, American Cement Co.	62,710
Chemical compound, certain, J. T. Wright	62,739
Clothing, certain, Wright & Diston	62,738
Coffee and tea, Abraham & Straus	62,672
Colic and fever cure for horses and cattle, J. G. Truman	62,735
Collars and cuffs, waterproof, W. G. Starry	62,764
Cooking utensils, Roseville Pottery Co.	62,762
Corsets, Bay State Corset Co.	62,767
Cotton fabrics, dyed, O. Goetze	62,724
Cotton piece goods, Stebbins Lawson & Spragins Co.	62,771
Cutlery and edge tools, certain, Collins Co.	62,633
Delftware, Naamlooze Vennootschap Plateelbakkerij "Delft"	62,759
Dyestuff, black, Cassella Color Co.	62,718
Dyestuffs, coal tar, Actien-Gesellschaft fur Anilin-Fabrikation	62,707, 62,708
Emulsions of cod liver oil, Cloftlin Chemical Co.	62,720
Engines, internal combustion, International Power Co.	62,639
Felt roofing, Union Paper and Twine Co.	62,666
Fertilizers, Virginia-Carolina Chemical Co.	62,667
Films, plates, and photographic papers, Actien-Gesellschaft fur Anilin-Fabrikation	62,741
Finishing product, Keystone Varnish Co.	62,662
Fire standing goods, certain, Morgan Crucible Co.	62,664
Flour, wheat, Eagle Roller Mill Co.	62,648 to 62,650
Flour, wheat, New Era Milling Co.	62,652
Flour, wheat, Whaley Mill and Elevator Co.	62,669
Flour, wheat, Commercial Milling Co.	62,688
Flour, wheat, Central Dakota Flouring Mill Co.	62,719
Flour, wheat, Whaley Mill and Elevator Co.	62,737
Flour, wheat, Acme Milling Co.	62,740
Food, stock, Western Grain Products Co.	62,668

Foods, cereal breakfast, Postum Cereal Co.	62,732
Foods for infants and invalids, A. Horowitz	62,694
Fruit dried, Castle Brothers	62,685, 62,686
Furnaces, oil, Railway Materials Co.	62,702
Gin, Kaufmann Baer & Co.	62,695
Hair dyeing preparations, Actien-Gesellschaft fur Anilin-Fabrikation	62,674
Hats, felt and straw, Harris-Polk Hat Co.	62,691
Hosiery, Lord & Taylor	62,754
Hosiery and knitted underwear, J. S. Naylor & Co.	62,699
Ice cream and ices, powder used in the manufacture of, F. A. Beeler	62,677
Incandescent gas mantles, J. H. Ladd	62,663
Inks, printing, Queen City Printing Ink Co.	62,760
Insect repelling preparations, P. Brandt	62,682
Jewelry, Electric Chain Co.	62,689
Jewelry, certain, E. M. Weinberg & Co.	62,773
Jewelry, solid, plated, and precious metal ware, Paye & Baker Manufacturing Co.	62,729
Journal, monthly, H. J. Gondon	62,637
Knit goods, A. G. Spalding & Bros.	62,670, 62,671
Knit goods, certain, A. G. Spalding & Bros.	62,705
Knit underwear, Bedford-Willis Co.	62,676
Lamps, electric, Gill Brothers Co.	62,746
Magazines and pamphlets, Globe Machine and Stamping Co.	62,747
Matches, safety, Jonkopings och Vulcans Tandsticksfabriksaktiebolag	62,726, 62,727
Medical preparation for the skin, Boots Pure Drug Co.	62,681
Medicinal preparation in liquid, salve, or cream form, M. E. Pease	62,730
Medicines, certain, Carleton & Hovey	62,684
Medicines for venereal diseases, J. T. Padgett	62,701
Medicines, headache, C. Breves	62,711
Metal manufactures, certain, Continental Iron Works	62,635
Milk and cocoa, mixture of dry, G. Kammermann & Cie. Schweiz. Trockenmilchgesellschaft	62,723
Milk and cream, prepared, A. Fay	62,659
Paint, certain, Jenkins Paint and Oil Co.	62,660
Paints, enamels, stains, and varnishes, Arme White Lead and Color Works	62,706
Paper and envelops, Raynor & Perkins Envelope Co.	62,761
Paper, tissue, John Hoberg Co.	62,749
Periodical, monthly, Vickery & Hill Publishing Co.	62,647
Pianos and pianos with interior players, Jacob Doll & Sons	62,641
Pile cure, J. J. Hoar	62,693
Plumbago or graphite for lubricating purposes, Morgan Crucible Co.	62,757
Powder, bug, A. Nussey	62,700
Preparation for the cure of dyspepsia, L. M. Green	62,696
Punch, arrack, Aktiebolaget Barthd. Dahlgren	62,675
Rakes, shovels, trowels, etc., garden, Trout Hardware Co.	62,766
Ranges, stoves, and heaters and vapor stoves and ovens, gas, American Stove Co.	62,658
Razors and razor blades, Kampfe Bros.	62,750, 62,751
Razors, razor blades, and safety corn knives, safety, Kampfe Bros.	62,752, 62,753
Remedies, eye, Haley-Layburn Eye Infirmary	62,690
Remedies for certain diseases, Microline Medicine Co.	62,728
Remedy for blood diseases, Blood Balm Co.	62,679, 62,680
Remedy for disorders of the bowels, Microline Medicine Co.	62,698
Saws and saw blades, Henry Disston & Sons	62,638
Scientific apparatus, appliances, and instruments, certain, R. J. Sachers	62,657
Seed, grass, H. E. Conklin	62,743
Shirts, overalls, duck coats, and jumpers, Byrne & Hammer Dry Goods Co.	62,683
Shoes, S. Dalsimer	62,744
Shoes and slippers, leather, B. Rosenberg & Sons	62,643, 62,656
Silk dress goods, F. L. Bryant	62,712
Soap, Iowa Soap Co.	62,640
Soap, S. Palmer	62,645, 62,646
Soap, G. A. Schmidt	62,763
Stiffening blades, cords, tapes, and fabrics, Warren Featherbone Co.	62,736
Stoves, ranges, furnaces, and heaters, Co-operative Foundry Co.	62,721
Surgical bandages, G. A. Craven & Co.	62,651
Tea and coffee, Abraham & Straus	62,673
Textiles, certain, F. Butterfield & Co.	62,713
Tires, pneumatic cushion and solid rubber, Diamond Rubber Co.	62,745
Umbrellas, F. F. W. Greef	62,725
Washboards, American Washboard Co.	62,742
Washing machines, International Factories Co.	62,748
Water, mineral, Heinrich Mattoni Aktiengesellschaft	62,692
Whisky, Bernheim Distilling Co.	62,678
Whisky, Albert M. Guggenheim Co.	64,709
Whisky, C. P. Moorman & Co.	62,714 to 62,717
Whisky, Daviess County Distilling Co.	62,722
Whisky, F. C. Renziehausen	62,733
Whisky, C. P. Moorman & Co.	62,768
Whisky, J. J. Douglas Co.	62,770
Whisky, rye, Thos. G. Carroll & Son Co. of Baltimore City	62,704, 62,772
Wrenches, pipe and nut, Keystone Manufacturing Co.	62,642
Yarn produced from cellulose of viscose, G. Lund	62,755

LABELS.

"Appetigenum," for a medical compound, J. R. Avellanal	13,552
"Balmo Embalming Fluid," for an embalming fluid, Portland Chemical Co.	13,554
"Franklin's 44 Tonic," for a liquid tonic for the cure of chills, fever, colds, and la grippe, F. L. George	13,553
"Gold Medal," for butter, K. C. Eldridge	13,550
"Hires," for root and root beer extract, Charles E. Hires Co.	13,549
"Liquid Bread," for beer, Thomas Ryan's Consumers' Brewing Co.	13,547
"Liquid Bread," for ale, Thomas Ryan's Consumers' Brewing Co.	13,548
"Nirvana," for game boards, E. J. Bond	13,557
"Pay Car Overalls," for overalls, Meinhard, Schaul & Co.	13,558
"Pecora Cuticle Enamel," for enamel for exterior and interior work, Pecora Paint Co., S. Bowen's Son successor	13,555
"Rainier Beer," for beer, Seattle Brewing and Malting Co.	13,546
"Teddy's Bear Hunt Game," for a game, S. D. Bowers	13,556
"Wenatha B-L Hair Fluff," for a preparation for improving and fluffing the hair, Bellman & Co., A. B.	13,551

PRINTS.

"Incenso," for deodorants, Incenso Co.	1,987 to 1,994
"Kewanee Water-Supply Co.," for a complete outfit for furnishing a water supply system, Kewanee Water Supply Co.	1,986
"Men's and Boys' Apparel," for men's and boys' apparel, H. C. Lytton	1,998
"Tour Backs, Tourists Playing Cards," for playing cards, United States Playing Card Co.	1,995
"$ Two $ Hats Truly Warner," for hats, T. Warner	1,997
"Warren's Wishbone Patternett," for collar supports or foundations, Warren Featherbone Co.	1,996

A printed copy of the specification and drawing of any patent in the foregoing list, or any patent in print issued since 1863, will be furnished from this office for 10 cents, provided the name and number of the patent desired and the date be given. Address Munn & Co., 361 Broadway, New York.

Canadian patents may now be obtained by the inventors for any of the inventions named in the foregoing list. For terms and further particulars address Munn & Co., 361 Broadway, New York.

WANTED.—Electrician, $1,400 per annum, Navy Yard, Pensacola, Fla. A competitive examination will be held simultaneously for the above position at the Navy Yards, Brooklyn, N. Y., Washington, D. C., New Orleans, La., and Pensacola, Fla., June 5, 1907. For further information address commandant of the yard at which the applicant desires to be examined.

STEAM TURBINES.—THEIR CONSTRUCTION, Operation and Commercial Application. SCIENTIFIC AMERICAN SUPPLEMENTS 1306, 1307, 1308, 1422, 1400, 1447, 1370, 1372. The articles have all been prepared by experts in steam engineering. Price 10 cents each, by mail. Munn & Co., 361 Broadway, New York City, and all newsdealers.